

**A STUDY OF RELATIONSHIP
BETWEEN PROBLEM SOLVING AND SOME RELATIVE
PERSONALITY TRAITS USING PIAGETIAN - TYPE TASKS**

DISSERTATION

Submitted to

THE UNIVERSITY OF RAJASTHAN, JAIPUR

in partial fulfilment of the requirements for the degree of

MASTER OF EDUCATION

1980 - 81

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Dedicated to
the sweet memory of my beloved
Mother

C E R T I F I C A T E

This is to certify that Miss Vandana Raizada,
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Ajmer has conducted and completed the investigation
"Study of Relationship Between Problem Solving and Some
Relative Personality Traits Using Piaget type of Tasks"
under my supervision. This work is her own.

May, 1981

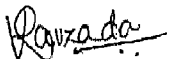
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ACKNOWLEDGEMENT

The investigator feels highly indebted to her supervisor Dr.N.Vaidya for providing all types of help and guidance in completing this research investigation. He is a great humanist and an outstanding researcher in the field of Piagetian theory. Words are feeble to express deep sense of gratitude the investigator bears towards him.

Thanks are also due to the Principals, students, teachers and my friends, for their genuine help in the collection of data for the present study.

In the end the investigator cordially thanks her uncle Gyan Singh for typing this research report with attention and devotion.


(VANDANA RAIZADA)

INTRODUCTION

"There is a fascination in experimental work felt even by those who are not so fortunate as to follow it as a vocation. In searching the unknown for new truths there is a mystery, there is adventure there is a thrill of discovery. As most of us know, also, there are grinding routine and disappointments. Research is a hard mistress, but her rewards bring satisfaction that few of us would forego".

--- Unknown

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CHAPTER I

"Humanity has in the course of time had to endure from the hands of science two great outgages upon its naive, self-love. The first was when it realised that our earth was not the centre of the universe, but only a tiny speck in a world-system of a magnitude hardly conceivable The second was when biological research robbed man of his peculiar privilege of having been specially created, and relegated him to a descent from the animal world implying an ineradicable animal nature in him... But man's craving for grandiosity is now suffering the third and most bitter blow from present day psychological research which is endeavouring to prove to the "ego" of each one of us that he is not even master in his own house, but that he must remain content with the veriest scraps of information about what is going on unconsciously in his own mind".

---- Freud Sigmund

CHAPTER I

INTRODUCTION

Importance of Problem Solving Ability in Life

"If life were of such a constant nature that there were only a few chores to do and they were done over and over in exactly the same way, the case for knowing how to solve problems would not be so compelling. All one would have to do would be to learn how to do the few jobs at the outset". (Henderson and Pingry, 1953).

However in a rapid changing world it becomes imperative that people develop the capacity to adapt to new situations, to make discriminations, think critically and creatively and make sound judgements. The day-to-day ability to recognise and solve practical problems as well as the concern with the ability to handle intellectual problems has become a major goal of schooling.

Physical and social environment is becoming more and more complex day by day. New problems are coming up, problems which were never imagined before-new professions, new diseases, new social situations producing mental tensions, new adjustment problems and rapidly changing attitudes and values of life.

In such a modern age old simple traditional methods of adjustment cannot be satisfying to an individual. For successful adjustment with his environment he will have to look to his problems in a more dynamic way and search for their solutions befitting to the present situations. In short, in the world of to-day if the individual fails to develop appropriate insight in understanding and solving his day-to-day problems, he will feel helpless in successfully dealing with his fast changing environment, feel frustrated and may try to runaway from these problems. On the otherhand competence in dealing with his problems will make him more self-confident, creative and successfully adjusted with his environment. Such a competent individual will not be lost in the whirlwind of confusion and uncertainty.

In developing this competence the role of educational institutions is obvious. It is quite clear that the purpose of schooling should not be confined to the teaching of unvarying routines and details which may characterise training in specific jobs. Solutions to school problems may be of little value to students who will likely to face much different problems after they leave schools. What is, thus, to be realised is that it is not so much important to get the solution of the problem as to learn the ways to deal with wide variety of problems. There is much evidence in and out of school

to show that only few persons ever learn to handle their problems effectively and rationally. Instead, it is much more common to find persons facing problems by rote memorisation of rules or by affective impulse. In a study by Henry (1934) it was found that only 32% of a group of college students, all of whom had studied high school geometry, showed any insight in solving geometrical problems. The rest 68% relied on habit. Similarly in a study of Blair, Jones, and Simpson (1962 pp.255-256) in which college students were asked to find out the square root of six digit numbers, most of the students obtained the answer by long form (long since forgotten) instead of attacking the problem by the methods of logical thinking. The failure of many people to make a direct and straight-forward attack upon problems is reflected in difficulties of adjustment, poor adjustment and inability to make decision. As Robinson (1960) informs, writers in the field of counselling list decision making as one of the common areas of adjustment problems. For such persons set rules of adjustment and pieces of advice in popular books are not of much practical help. There is no substitute for actual experience in solving problems, facing difficulties making errors, and finally discovering solution which leads to action. "A good problem is a good motive for learning. Secondly it is

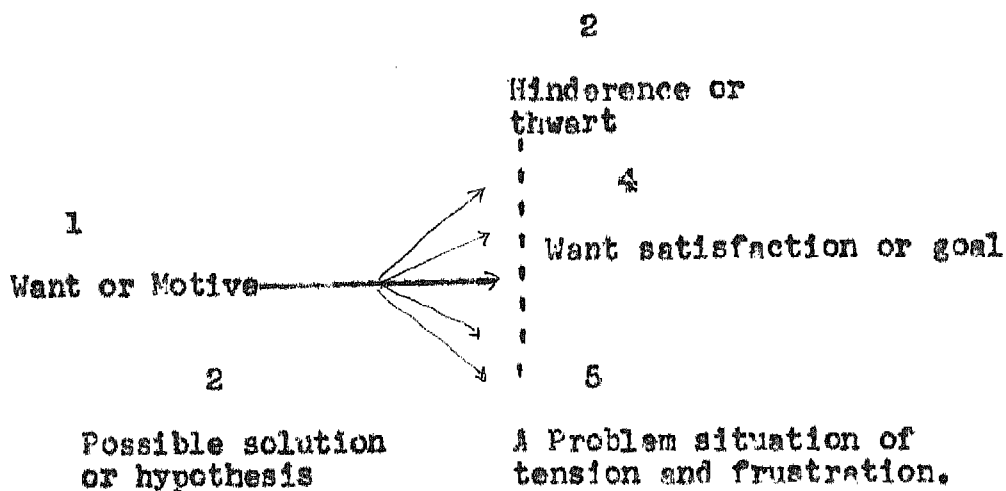
conducive to the building up of confidence in one's ability to work things out for himself. This has definite value for individual's mental health, for one of the first principles of 'mental hygiene is that difficulties should be regarded as problems to be solved rather than as emergencies to be evaded".
(Kingsley, 1945)

The long range objective of the present study is to help develop problem solving ability in children through understanding the nature of problem solving ability and the personality factors affecting the development of this ability.

Nature of Problem Solving

"Problem solving is a process of overcoming difficulties that appear to interfere with the attainment of a goal". It is a procedure of making adjustments in spite of interferences" (Gray, J.S. 1964). The State of tension created by unsatisfied wants drives the individual to exercise his greatest efforts and to use this best language techniques - observation, prediction and inference - to control the difficulties that hinder progress towards this goal of want satisfaction. Successful problem solving and successful living are identical. Culture itself is but

a record of how our ancestors have solved various problems. Gray has given a diagrammatic representation of a problem solving situation as below -



A problem exists for an individual when he has a definite goal that he cannot reach by the behaviour patterns which he already has available. Problem solving occurs when there is an obstruction of some sort to the attainment of an objective. If the path to the goal is straight and open there is no problem- (Woodworth, 1938). It is when one has to discover a means of circumventing an obstacle that the stage is set for reasoning. In arriving at a solution of the situation it is necessary to select out of previous experiences those that are particularly relevant to the present task and to organise those phases of previous learning into a new pattern of response. Thus, according to Gates and his associates (Gates et al 1948, p.449) process of problem solving in its most direct and effective form has the following features.

- 1- It is directed by the goal and a perception of the essential relationships in the situation.
- 2- It is selective for one of the keys to successful solution is the ability to recall relevant experiences.
- 3- It is insightful, for it involves the reorganisation of relevant experiences into a complete solution with particular reference to means-and relation.
- 4- It is creative, for it results in an essentially new construct-a reorganisation of ideas or movements or both.
- 5- It is critical, for it is necessary to evaluate the adequacy of hypotheses or tentative solution.

A description of the problem solving process is little more than a reformulation of the learning process. However there are differences on emphasis. Every situation in which a student has a need and a goal, with a barrier between, leads to some kind of learning. But such a situation will be reck^{oned} as a problem situation only when he recognises it as a problem situation, turns energy towards it, arrives at a judgement and checks his first^{nal} decision.

Some other characteristics of problem solving as given by Skinnerⁿⁿ (1964, p.173-195) and others are:

- 1- Even pre-school children are capable of problem solving behaviour.

Although young children have been thought capable of sensorimotor and associative learning to the extent of acquiring specific skills and information, it has often been assumed that they are incapable of problem solving behaviour. It is further believed that reasoning ability makes its appearance suddenly and that it is primarily if not entirely, the result of heredity forces. However since long, research has shown that even pre-school child is capable of problem solving behaviour. In a study of by Alpert (1928) the problem solving behaviour of forty four children, ranging from nineteen to forty four months of age, was studied with problems similar to those used by Köhler with his chimpanzees. In one series of problems situations called for placing a block, a chair, a block turned on its perpendicular side or a block piled on top of a box in such a way as to secure a suspended toy. In a second series of problems children were placed in a play pen with the toy outside. To get the object, the child was required to reach through the bars with a stick, to substitute the broom for the sticks, to use a short stick to reach a longer one, which in turn could be used to procure the toy, and to place two parts of a fishing rods together for a tool. It was found in this study that seventy two percent of the total possible number of solutions actually occurred. The solutions showed evidence of the ability of the children to recognise the problems

and to perceive and employ means for reaching the goal. No matter what type of response to the problem situation was made, the behaviour culminated in a solution only when insight was attained.

In the same way the studies of Roberts (1933) and M Waier (1936), have shown that young children can discover and employ principles in the solution of problems. Children of three years have been found to discover a principle and use it in a new situation and children of five years have been found to organise two different experiences in the solution of maze problem and reach their goal.

2- Competence in problem solving increases with age. The young child is handicapped by meagre experience, by inadequate language development, by inability to perceive subtle likeness and differences by lack of skill in overt behaviours and so on.

3- Competence in reasoning and problem solving though heavily dependent, perhaps, on genetic inheritance, does not appear by magic or achieve maturity overnight. Acquisition of problem solving ability is the result of developmental process and is definitely conditioned by the adequacy of stimulation and learning activity throughout the developmental period.

Piagetian Thinking Regarding Problem Solving
Abilities in Children -

During this century Piaget is a great name in the field of Psychology and Education and his ideas are widely discussed in this field and in psychiatry and even Philosophy, because he has said something relevant touching upon all these fields. Regarding problem solving abilities in children, during about fifty years of their studies he and his co-workers have examined thousands of children ranging from ^{neonates} ~~rennotes~~ to adolescents and published thirty ^m volumes and countless articles on the subject of infant and child thinking process. As it stands to-day Piaget's concept of the development of problem-solving ability in children is unique in its complexity and comprehensiveness.

According to Piaget mental structures needed for problem solving ability are constructed. Structures do not come from simply making a mental record of the World that is by keeping eyes and ears open. Work done by Van Senden with congenitally blind persons testify the view point. These blinds who gained sight after surgery could not distinguish a key from a book when both lay on a table in front of them. They also could not distinguish between a square and a circle. The important point to note was that whether the problem is to distinguish between simple objects in the environment or to analyse a

complex situation, the ability to develop appropriate mental structure and meaningful understanding of these situations requires much more than a simple photographing of environment.

Plato thought that the mental structures were innate and developed through the passage of time and development of the brain albeit nourished by environmental encounters. Piaget rejects' Plato's views except to admit that certain very primary structure must be present at birth. His view is that the development of structures derives from a dynamic interaction of the organism and the environment and this process of interaction he calls 'self-regulation' or 'equilibration'. This is perhaps the most important single idea in Piagetian thinking although quite difficult to grasp.

What is this Process of Self-Regulation?

According to Piagetian thinking self-regulation is the process by which the child's actions lead to the construction and reconstruction of progressively more and more complex and powerful mental structures. From birth, basic structures enable the child to begin interaction with his environment. However due to child's inborn drive to interact with his environment, he meets contradictions, that is, things which do not fit his present mental structures. These contradictions produce a state of disequilibrium. In order to obviate this state of disequilibrium and make

the situation more meaningful the child alters or replaces his present inadequate mental structures to a better or more potent ones. This he does through continued investigation himself and guidance from others. Once this is accomplished he is able to assimilate the the new situations through the development of a new mental structure. If the new structure guides the chil's behaviour in a way that his efforts are rewarded(reinforced) the structure is also reinforced. In this way the child builds new mental structures and adopts to new situations.

Here, throughout the process of the development of new mental structures, the emphasis is on the "self" became the process by its very nature is the internal regulation that can not be circumvented using external agent (Lawson & Renner, 1975).

Stages of Cognitive Development-

According to Piaget the child during the development of his problem solving ability passes through the following major periods of patterns of thinking.

1- Sensory Motor Period-

This period extends from birth to one and a half year or two years. According to Piaget at birth the child is in a sensory motor state. During the first eighteen months or so of life child acquires such

practical knowledge as the fact that objects continue to exist even when they are out of sight, that is he learn that concept of "object permanence".

Thus during the sensory motor period the reflexive behaviour of the new born develops into symbolic behaviour at about 18 months. In the beginning the World is a 'buzzing blooming confusion' in which he cannot differentiate it from himself. Self and the World are undifferentiated. However But at the conclusion of this period events and objects of the World gain some identity of their own in the eyes of the child. However the sensory motor thought is essentially "an intelligence in action and in no way reflective".

2- Pre-Operational Stage-

This period extends from about two years to around seven years of age. During this period the child's thinking shows the following characteristics:

- i) He exhibits extreme egocentrism. However as his social contacts and social interests widen he tends to become less and less self-centered.
 - ii- He sees things in his own frame of reference.
 - iii- He centres his attention only upon a particular aspect of given objects, events or situations.
- He can think of only one idea at a time. He does not demonstrate conservation reasoning. In other words child's thinking is extremely rigid.

- iv- His thinking is governed by the perceptual considerations of the situation. He makes the judgement as he sees the situation. Thus he reasons "transductively".
- v) During this period the major achievement of the child is the acquisition of ^{language.} knowledge. However he uses language in a limited way because he feels difficulty in expressing his thoughts. He carries on conversation with himself and in this he least bothers whether others listen to him or not.

3- Concrete Operational Stage-

Around seven years the thinking process of the child begins to "thaw out", now his thinking becomes less and less rigid. Other characteristics of this stage are -

- 1) This stage is marked by the development of operations. Concrete operations are defined as mentally internalised and reversible systems of thought based on manipulations of classes, relations and quantities of objects. The operations involved are called concrete because they relate directly to object and not yet to verbally stated hypotheses. Thus the mental operations performed at this stage are "object bound" - they are tied with objects. The child cannot react to "absent" situation.

- ii) The child can now attack problem systematically, however he cannot yet find mathematical proofs.
- iii) Child does not accept hypothetical data.
- iv) Reality dominates the thinking of the child and the possibility is subordinated to it.

4- Formal Operational Thought Stage-

This stage develops between eleven to fifteen years of age and constitutes the highest level in the development of mental structures. Those who enter this stage of formal thought are the individuals who think beyond the present and form theories about every thing "delighting specially in considerations of that which is not present". Other important characteristic of this stage is that the individual can now reason with verbal elements alone and there is no direct need for objects. His thinking is no longer tied to the concrete situations. He can imagine all sorts of facts hypotheses and possibilities.

Conclusions Related to the Present Problem-

From the above discussion certain broad obvious conclusions can be drawn regarding the nature and development of problem solving ability in a child.

- 1- Problem solving ability is significantly related to the inherent potentialities of the individual. However how much this potentially will be realised in developing

the problem solving ability in the individual will to a great extent depend upon the environmental factors and the self-efforts of the individual.

2- Even the developmental stages as outlined above have no fixed genetically determined age limits. Even Piaget only insists that the sequence in the stages of intellectual development remains the same for all children whatever may be their social, cultural, and national background. The children may not show these stages within the specified range of age, ^{as} he mentioned above. The age range may vary ^a according to the variation in the home and school environment and the self efforts of the individual. There is nothing predetermined in this sequences of development of mental structure",..... maturation of the nervous system can do no more than determine the totality of possibilities at a given stage. A particular special environment remains indispensable for the realisation of these possibilities" (Inhelder and Piaget, 1958 p.337).

Thus 'self-regulation' and environmental factors seem to be the two major forces in shaping the problem solving ability of the child. The nature of self-regulation is logically governed by the personality structure of the individual. It is, therefore, guessed that the personality

structure of an individual may play a significant role in shaping his problem solving ability. The present study is a humble effort to test this guess. In other words the present study aims at investigating how personality traits of an individual affect his problem solving ability.

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CHAPTER II

"For thousands of years man's everyday experience with falling objects did not suffice to bring him to a correct theory of gravity. A sequence of very unusual man made experiences, so called experiments which grew out of the systematic search for the truth were necessary to bring about a change from less adequate to more adequate concepts. To assume that the first hand experience of the social world would automatically lead to the formation of correct concepts or to the creation of adequate stereotypes seems therefore unjustifiable".

----- Kurt Lewin

CHAPTER II

REVIEW OF RESEARCH

Much literature seems to have developed to find the effect of environmental and educational factors on developing the problem solving ability in a child (Vaidya, 1977, 1978, 1980 to quoted only one source). However there does not seem to be many sources to quote the influence of personality traits in the developing of problem solving ability in a child. Whatever little is available and could be collected by the present investigator has been summarised in this Chapter.

The studies indicating the influence of personality factors on the problem solving ability of the child have been classified below into two major groups.

A. Studies directly focusing on the effect of Personality Factors on the Problem Solving Ability of the Child-

Under this head, the investigator could lay hand on some prominent studies recently undertaken in this area. They are summarised as below.

- (1) Effect of anxiety and depression on the cognitive performance of children.

In a study by Pishkin, Fishkin and Lovalla (1978) forty eight male hospitalised psychoneurotics who were located two weeks prior to the experiment were compared with twenty four hospitalised alcoholics on ability to solve a concept identification problem.

All subjects of the experiment scored high or low in depression and anxiety as measured by the 'Self Rating Depression Scale' and a shortened form of Taylor's Manifest Anxiety Scale.

It was found in this study that these subjects who were high in depression and anxiety showed fewer errors to the solutions of the problem than those who were low on these characteristics.

- (11) Effect of Affective Traits (of personality) on the Creative and Problem Solving Performance.

In a study by Tetanbaum and Houtz (1977), relationships between such affective traits as locus of control, self esteem and tolerance for ambiguity and problem solving and creativity measures were investigated. Problem solving and creative measures were administered to 127 gifted New York City school children from grade four to six. Affective measures used were, Bialer-Cromwell Locus of Control Scale, Coopermies Self Esteem Inventory and Rydell - Rose AT 20.

Analysis of the data through canonical correlations indicated a canonical set in which 46 percent of the variability in the set on cognitive measures was explained by a set of affective measures.

(iii) Effects of Personality on the Cognitive Test Performance.

In a study by Gob and Farley (1977) Personality effects on Cognitive test performance were investigated by experimental means. In this study 96 college students, randomly assigned to either 'unstressed' or 'stressed' condition, were administered revised Nufferne tests followed by the administration of Eysenck Personality Inventory. The data were analysed by a series of least square analysis in factorial design. The analysis led to the following conclusion:

- a- Extroverts performed faster on problem-solving latency than the introverts under the unstressed conditions.
- b- Neuroticism did not seem to significantly affect the problem solving latency.
- c- Labile-extroverts were significantly faster than stable-introverts in the unstressed conditions and stable-introverts, were found to be significantly faster than labile-extroverts in stressed conditions.
- d- Effect of stress was found on all personality groups. Performance under stressed conditions was found to be significantly faster but less accurate than unstressed performance.

(iv) Effect of Impulsive Thinking and Reflective Thinking on Problem Solving Ability-

In a study by Zelniker and Jeffery (1977) it was seen that impulsive children are not inferior to reflective children in general potential and problem solving ability. However the apparent difference in their problem solving ability is due to incompatibility between their preference for global processing strategy and the detailed analysis typically required for successful performance.

(v) Summarising a number of studies on problem solving conducted by himself and others, using factor analysis techniques, Vaidya (1981) found problem solving ability in one form or the other to be significantly related to such variables as: general adjustment, interest-factor, emotional-factors, social-factor and behavioural-factors.

B- Studies Indirectly Reflecting on the Effect of Personality Factors on the Problem Solving of an Individual-

In a study by Laugar & Baner (1978) it was seen that performances on problem solving task is significantly affected by immediately prior experience on a different but structurally identical problem.

In a study by Worth (1978) problem solving strategies on an inductive reasoning task were found differing in middle class and disadvantaged children.

In yet another study Juliano (1977) found that reflection-impulsivity to be not related to performance ability on concept learning tasks.

Conclusion Related to the Resent Problem-

From the few studies reviewed above it seems that the problem solving ability is definitely affected by the personality variables, particularly (besides intelligence) falling in the area of affective domain. It seems that such affective factors of personality as depression and anxiety and reflective thinking makes a person in a problem solving situation go more slowly but more ^{steadily} ~~carefully~~ minutely and in greater details and commit ^w fewer errors to the solution of the problem. On the other hand persons like labile-exextraquits although are faster in problem solving latency against the stable-introverts but in a stressful conditions the process is in the reverse direction. Stressful condition in the individual makes him start faster but in a less accurate way.

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CHAPTER III

"It is believed that a clear formulation even if later found incorrect, will ultimately lead more quickly and easily to a correct formulation than will a pussy-footing statement which might be more difficult to convict of falsity. The primary task of a science is the early and economical discovery of its basic laws. In the view of the scientifically sophisticated, to make an incorrect guess whose error is easily detected should be no disgrace; scientific discovery is in part a trial-and-error process and such a process can not occur without erroneous as well as successful trials. On the other hand to employ a methodology by which it is impossible readily to detect a mistake once made or deliverately to hide a possible mistake behind veasel words, philosophical fog, and anthropomorphic prejudice, slows the trial-and-error process and so retards scientific progress".

--- Hull, Clark L.

CHAPTER III

THE PRESENT PROBLEM AND ITS SPECIFICATIONS

In the first chapter the investigator discussed in some details the role of problem solving ability in the adjustment of the individual with his environment and also in the peace, progress and prosperity of a nation, nay the whole humanity. If the problem solving ability is such an important factor, the next logical question arises: as how to tap this valuable source or how to develop, to the maximum extent possible, this ability in our children. The basic problem in this context therefore becomes of -

- 1) Identifying the environmental and personality factors which significantly affect, directly or indirectly, the problem solving ability in children.
- ii) Creating such a situation as may help develop the problem solving ability of a child to the maximum extent possible.

Suitable control of a phenomenon is possible only when one has a scientific understanding of the phenomenon. In order to control the problem solving ability of children it is therefore necessary to understand the inner dynamics¹⁶⁸ of problem solving ability. The present study is an attempt in this direction.

As has been seen in the discussion in the previous two chapters, ^{that} problem solving ability is to a great extent an inherent inborn ability. However how far this inherent potentiality can be exploited and what shape will it take depends primarily on the environment in which it is nourished and the personal factors which create an urge to self-regulate this ability in the individual. Being limited in scope the present investigation focuses only on the later factors to see how they are effective in developing the problem solving ability in children.

Statement of the Problem

Thus the problem in the present study is to find out how do certain personality factors relate to the problem solving ability of a child. Formally stated the problem is -

"A Study of the Relationship between Problem Solving Ability and Some Relative Personality Traits Using Piagetian Type of Tasks"

Here the personality variable, chosen for study are the ones given by R.B.Cattell in his High School Personality Questionnaire (H.S.P.Q.). They are:

- A) Reserved, detached/warm hearted out going
- B) Less intelligent, concrete thinking/more intelligent, abstract thinking.
- C) Affected by feelings, emotionally less stable/emotionally stable, mature.
- D) Undemonstrative, Stodgy/excitable, demanding.

- E) Obedient, mild/assertive, aggressive
- F) Sober, serious/enthusiastic, head-less.
- G) Disregards rules, expedient/moralistic, persistent
- H) Shy, timid/adventurous, socially bold.
- I) Tough minded/tender minded.
- J) Zestful, likes group action/circumspect, individualism.
- Q₁) Self assured, secure/apprehensive, insecure.
- Q₂) Socially group dependent/self-sufficient, prefers own decision.
- Q₃) Uncontrolled, follows own urges/controlled, self-disciplined.
- Q₄) Relaxed, unfrustrated/tense, frustrated.

Similarly the problem solving ability has been considered through the following types of Piagetian problem situations.

- 1- Classification
- 2- Grouping of thought
- 3- Generalisations to Arithmetic and Algebraic symbols.
- 4- Permutations and combinations
- 5- Ratio and proportion
- 6- Formulating probing questions
- 7- Interpretation and coordination of information
- 8- Stating and testing hypotheses
- 9- Space visualisation
- 10- Grasping the essence of the problem

The choice of these personality variables and the problem solving tasks involving the above mentioned mental processes were determined by two main considerations.

i) Research Precedence - While reviewing the research studies on problem solving related to personality variables, it was found that effect of most of the personality variables included in this study have been investigated in relation to problem solving ability - of course with inconclu^sive results. Particularly it was seen that the problem solving ability is significantly affected by affective aspects^{of} personality.

Similarly for choosing the Piagetian type of tasks the main consideration was the lucid way in which he has presented these tasks to analyse various aspects of problem solving ability. As has been seen earlier, Piaget's work in the area of problem solving is now well recognised, although not well established, and a number of hypotheses related to his ideas are now being tested through a series of studies. The present study also wanted to make a humble ^{contribution} consideration towards this goal.

ii) Practical considerations.- Most of the personality variables which were considered in related^{ion} to problem solving ability in previous studies were found to be a part of a single personality test constructed by R.B.Cattell.

Seeing the limitations of the present student it was therefore considered desirable to include these personality variables alone for study.

Hindi version of the ten Piagetian types of tasks were readily available in two test booklet from which also tempted the investigator to include them in this study.

Purpose of the Present Study

The present investigation was undertaken for the following purpose.

- 1- To decipher the personality characteristics which are generally found associated with the problem solving ability of a child.

For this purpose the investigator picked up certain personality characteristics on the basis of research evidence and practical considerations to find out.

- 1- which of the personality variables relate to problem solving ability.
- 11- in what manner are they related to problem solving ability
- 2- To cross validate the results of the present study with the results of similar studies on problem solving conducted earlier.

The results, it was expected, may help to throw more light on the relationship between personality characteristics and problem solving ability in children.

3- To find the contribution of the investigated personality variables in predicting the problem solving ability of children.

The intention here was to provide help, however meagre it may be to educators and guidance workers who are engaged in the task of developing problem solving ability in children, in controlling and developing those personality qualities in children which help them in maximally developing problem solving ability in them.

Hypothesis tested in this Study

To achieve the above mentioned purposes the following hypothesis, most of which emanating or being indicated by the review of earlier research, have been tested in the present study.

- 1- Reserved and detached children are better problem solvers.
- 2- Children with better power for abstract^{ty} thinking (more intelligent) are better problem solvers.
- 3- Children with emotionally stable and mature personality are better on problem solving tasks.
- 4- Undemonstrative and stodgy children are better on problem solving tasks.
- 5- Assertive and aggressive children are not so good in problem solving as are the obedient and mild children.
- 6- Sober and serious children have more problem solving ability.

- 7- Persistent children have more chance of having better problem solving ability.
- 8- ^{Adventurous} Adventurous and socially bold children have better chances of developing their problem solving ability to the maximum.
- 9- Tenderminded children can better exploit their problem solving ability.
- 10- Zestfulness may not be of much help in developing problem solving ability in a child.
- 11- Apprehensive and insecure persons may make better use of their problem solving ability.
- 12- Self-sufficient and persons preferring their own decisions are expected to be better problem solvers.
- 13- Self-disciplined children seem to better exploit their problem solving ability.
- 14- Slightly frustrated children may make fewer errors in their problem solving tasks.

15- ^{There are no sex differences in problem solving ability.}
Limitations of the Present Study 16- ^{Problem Solving ability increases with grade in degree}

- 1- All the sample data of the present study were drawn from the City Schools of Jhunjhunu (Rajasthan)
- 2- The study was confined to only three schools of the City of Jhunjhunu.
 - (i) Govt. Higher Secondary School for Boys
 - (ii) Govt. Higher Secondary School for Girls
 - (iii) Govt. Middle School, Batwala.
- 3- The study was confined to the students of Class VII to XI only.

CHAPTER IV

"Keep close to experience; add as little of your own as possible; if you have to add something, be mindful to give an account of every step you take".

---- P.M.Urban

CHAPTER IV

PLAN AND PROCEDURE

This chapter discusses in some details the nature of the sample on which the study was conducted, the tools which were used in this study and the plan and procedure adopted for securing, classifying, analysing and interpreting the data.

The Sample

The area of present investigation was chosen to be the City of Jhunjhunu. This City is situated in the backward western region of Rajasthan. Most of the studies on problem solving were conducted on typical city situations. It was therefore thought to choose this time a backward area to confirm the generalability of the results previously obtained on the children of big cities.

As the study was ^{intended} instead to be conducted on five grades of children from Class VII to Class XI to study the developmental trend in the problem solving ability of children, the study was confined to only three schools of the city viz.

- 1- Govt.Higher Secondary Schools (Boys)
- 11- Govt. Higher Secondary Schools (Girls)
- and 111- Govt.Middle School, Batwala

These institutions were randomly selected out of the schools in the City. In this sample both the sexes were attempted to be given equal representation at all grade levels, However due to weeding out of certain test-answer sheets, because they were either incomplete or forged, the final figures gradewise were as follows.

Grades	Boys	Girls
VII	16	13
VIII	15	10
IX	21	14
X	11	18
XI	11	24
TOTAL	74	79

In this way in this study in all 153 students of grades VII to XI were included and both the sexes were approximately equally represented.

Tools Used in the Study

1- Hindi Version of Cattell's H.S.P.Q. Test of Personality

Cattell's H.S.P.Q. test of personality is originally in English. S.D. Kapoor and K.K.Mehrotra adopted it in Hindi. This Hindi version of the test has been used in the present study. The test has two parallel forms' Form A and Form B. Each form has 114 questions including two questions one in the beginning asking if the subject has understood the instructions and the last asking if he has attended all the questions. Each question in the test is followed by three answers. 'Yes, No?' and the subject has to choose one of these alternatives in answering the question. The questions are intended to measure fourteen personality characteristics already mentioned in Chapter III.

The test can be taken in a group or individually. There is no time limit for the test but roughly it takes about 45 minutes to answer all the questions in the test. The tester loudly reads out the instructions given on the first page of the test booklet and explains the practice exercises there. The students are asked to clarify all the doubts and difficulties related to the test before they start working on it. Having ensured that the students have followed the instructions well, the tester signals them to start the test.

The protocols are scored according to the scoring keys of the test and the scores are classified under fourteen personality characteristics. Manual provides the norms for both the sexes separately.

The manual provides three types of reliability for the test.

test-retest reliability

split-half reliability

and parallel form reliability

All these reliabilities are given for each of the fourteen personality variables. The reliability coefficients (test-retest) range from .51 (in the case of factor O form B) to .77 (Q₄ and B form A). Consistency [form B) to .93 (Kapoor & Mehrotra, 1967). (for Q₃ in form P). Range of equivalence coefficient (parallel form) is .4 (for B) to .76 (for A).

2- Test on Problem Solving

This test on problem solving contains 10 Piagetian types of problem tasks. Hindi version of this test as was used in a previous Ph.D. study (Sandhu 1980) was readily available to the investigator, hence it was used in this study without any modification.

The test is divided into two parts. The first part contains five questions on -

- 1- Classification
- ii- Grouping of thought (Consisting of classification, assimilation, identification, inversion and tautology).
- iii- Generalisation to arithmetic and algebraic symbols.
- iv- Permutations and combinations
- v- Ratio and Proportions

The second part contains the remaining five problems on -

- vi- Formulating probing questions
- vii- Interpretation and coordination of information
- viii- Stating and Testing hypotheses
- ix- Space Visualisation
- x- Grasping the essence of the problem

Method of Securing Data

The H.S.P.Q. test of personality and the two tests of problem solving were administered to the randomly chosen students of Classes VII, VIII, IX, X and XI in the three chosen schools of the City of Jhunjhuma.

The test of personality was given first and then the tests on the problem solving. The same order and presentation was followed in all the three schools. In between these tests gap of one class period was given to eliminate the possibility of fatigue in the students.

Both these tests were administered according to the instructions given on the test or the manual of the test. One class-period was allowed for the personality test and two class periods for the problem solving tests were allowed to the students.

Method of Scoring and Classification of the Data-

The responses of the students on these two types of tests were scored according to the instructions in the manual of the tests and in the case of H.S.P.O. test with the help of stencil-keys. The scores accordingly were classified under fourteen personality variables and ten problem variables. These scores were then reclassified sexwise and gradewise also.

Analysis of the Data-

The obtained data were analysed with the help of correlation coefficients between different variables and the multiple regression equations (with appropriate weights) using the personality, sex and grade as independent variables and problem solving abilities (on ten problems separately) as dependent (criterion) variables. Besides these other suitable statistics and statistical methods have also been used for analysis and interpretations of the obtained data (Garrett, 1969).

Computer analysis of the data was done with the assistance of Data Processing Unit of N.C.E.R.T., New Delhi

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CHAPTER V

"..... Science must create its own language; its own concepts for its own use. Scientific concepts often begin with those used in ordinary language for the affairs of every day life, but they develop quite differently. They are transformed and lose the ambiguity, associated with them in ordinary language, gaining in rigourousness so that they may be applied to scientific thought.

..... Einstein and Infeld

CHAPTER V

ANALYSIS AND INTERPRETATION OF THE DATA

In this chapter the accumulated data have been graphically analysed to test the hypotheses stated in Chapter III. However not only the hypotheses as they have been stated in Chapter III have been tested through statistical analysis for problem solving as a whole but also the relationship between various personality traits, classes and sex have been investigated in relation to the ten components of the problem solving ability as considered in the present study.

In the present study problem solving ability and its ten components considered therein have been treated as dependent variables and the personality characteristics, sex and classes have been treated as independent variables.

In this chapter analysis and interpretation of the accumulated data have been done under the following heads:

- 1- Problem solving as a whole in relation to the personality qualities, sex and grade.
- 2- Different problem solving tasks in relation to the personality variables, sex and grade.
- 3- Different independent variables in relation to problem solving tasks.

4- Overall view of the study.

RELATIONSHIP BETWEEN PROBLEM SOLVING ABILITY (AS A WHOLE)
AND THE INDEPENDENT VARIABLES OF CLASS, SEX AND
PERSONALITY CHARACTERISTICS

The relevant correlations between the independent variables and the dependent variable are given in Table 5.1.

TABLE 5.1

CORRELATIONS BETWEEN THE PROBLEM SOLVING AS A
WHOLE AND THE FOLLOWING VARIABLES (N = 138)

1.	Class	.453197**
2.	Sex	.642469**
3.	Reserved, detached/warm hearted outgoing	.036986
4.	Intelligence	+.502246**
5.	Emotional Stability	- .080819
6.	Undemonstrative studgy/excitable, demanding.	-.155705
7.	Obedient, mild/assertive aggressive	-.124602
8.	Sober serious/enthusiastic, heedless	.137299
9.	Desregards, rules, expedient/moralistic, persistent.	.311528**
10.	Shy timid/adventurous socially bold	.082509
11.	Tough minded/tenderminded.	.193089*
12.	Zestful likesgroup actions/circumspect, individualism.	.003351
13.	Self assured, secure/apprehensive, insecure.	-.104107
14.	Socially group dependent/self sufficient	.161314
15.	Uncontrolled, follows own urges/controlled, self-disciplined.	.129681
16.	Relaxed unfrazustrated/tense-frazustrated	.273075**
** Significant .01 level		
* Significant .05 level		

From this table following conclusions can be drawn.

1- Problem solving ability seems to be significantly correlated with

- | | |
|----------------------------|----------------|
| (i) Grades | (at .01 level) |
| (ii) Sex | (at .01 level) |
| (iii) Intelligence | (at .01 level) |
| (iv) Persistence | (at .01 level) |
| (v) Ergic tension | (at .01 level) |
| and (vi) Tender mindedness | (at .05 level) |

2- Problem solving seems to be moderately correlated with self sufficiency also. Correlation of .16134 between these two variables is not significant but is very close the figure of .1678 which is significant at .05 level (with df. = 137).

3- Other independent variables do not seem to be related to the problem solving ability as such.

4- Hypotheses nos. 3, 7, 9, 10, 14 and 15 as stated in Chapter III are not rejected, the rest are rejected.

Higher grade levels are also indicative of higher age level of the students. The obtained conclusions therefore are indicative of the fact that problem solving ability is a developmental phenomena which increases with the age level of the individual while he is undergoing usual educational development also.

In the present study sex has also been found to be significantly related to problem solving ability. In most of the classes particularly from VII to IX girls have been found to be better problem solvers than the boys.

As expected intelligence has also been found to be a potent factor in affecting the problem solving ability of an individual.

The results also indicated that persistence, energetic tension and sensitivity in behaviour (tendermindedness) might be positively effective in problem solving tasks. Similarly self-sufficiency might also be a positive factor in this direction.

DETAILED ANALYSIS OF DIFFERENT PROBLEM SOLVING TASKS IN RELATION TO PERSONALITY VARIABLES, SEX AND GRADE.

1. Relationship of Independent Variables with Problem Solving Ability of "Classification".

Relevant correlations between the independent variables and the ability to 'classify' have been given in the Table 5.2.

TABLE 5.2

CORRELATION BETWEEN THE PROBLEM SOLVING ABILITY OF
"CLASSIFICATION" AND THE FOLLOWING VARIABLES (N=119)

1-	Class	.058512
2.	Sex	.377899**
3.	Reserved, detached/warm hearted outgoing	-.014208
4.	Intelligence	.349170**
5.	Emotional Stability	-.2491 -.064788
6.	Undemonstrative studgy/excitable, demanding	-.155200
7.	Obedient, mild/assertive aggressive	.008111
8.	Sober serious/enthusiastic, heedless.	.013060
9.	Desregards, rules, expedient/ moralistic, persistent.	.209295*
10.	Shy timid/adventurous socially bold	-.216762 .025076
11.	Tough minded/tenderminded	+.16767^
12.	Zestful likes group actions/ circumspect, individualism.	.069863
13.	Self assured, secure/apprehensive, insecure.	-.108839
14.	Socially group dependent/self sufficient.	.221646*
15.	Uncontrolled, follows own urges/ controlled, self-disciplined.	.089068
16.	Relaxed unfrustrated/tense- frustrated	-.203075 -.019162

** Significant .01 level

* Significant .05 level

The following conclusions can be drawn from the above correlation table.

1- Problem solving ability of "classification" is significantly correlated with -

(i) Sex	(at .01 level)
(ii) Intelligence	(at .01 level)
(iii) Persistence	(at .05 level)
and (iv) Self-sufficiency	(at .05 level)

2- "Classification" ability seems to be moderately correlated with sensitivity in behaviour (tender mindedness). Correlation between them was found to be .167670 which is not significant even at .05 level but very close to the figure (.174) significant at this level.

These conclusions indicated that the problem solving ability of "classification", it positively affected by sex, intelligence, persistence, self sufficiency and to some extent ^{by} sensitivity in behaviour. As further analysis of the data revealed girls were again found to be superior to boys in the tasks implying 'classification' ability. This was particularly true in lower classes i.e. VII to IX (See Fig.5.1).

The results also indicated that educational development or age factor did not substantially effect this ability of 'classification' (See Figure 5.2).

It seemed therefore that 'classification' ability is predominantly biologically governed ability. Age and

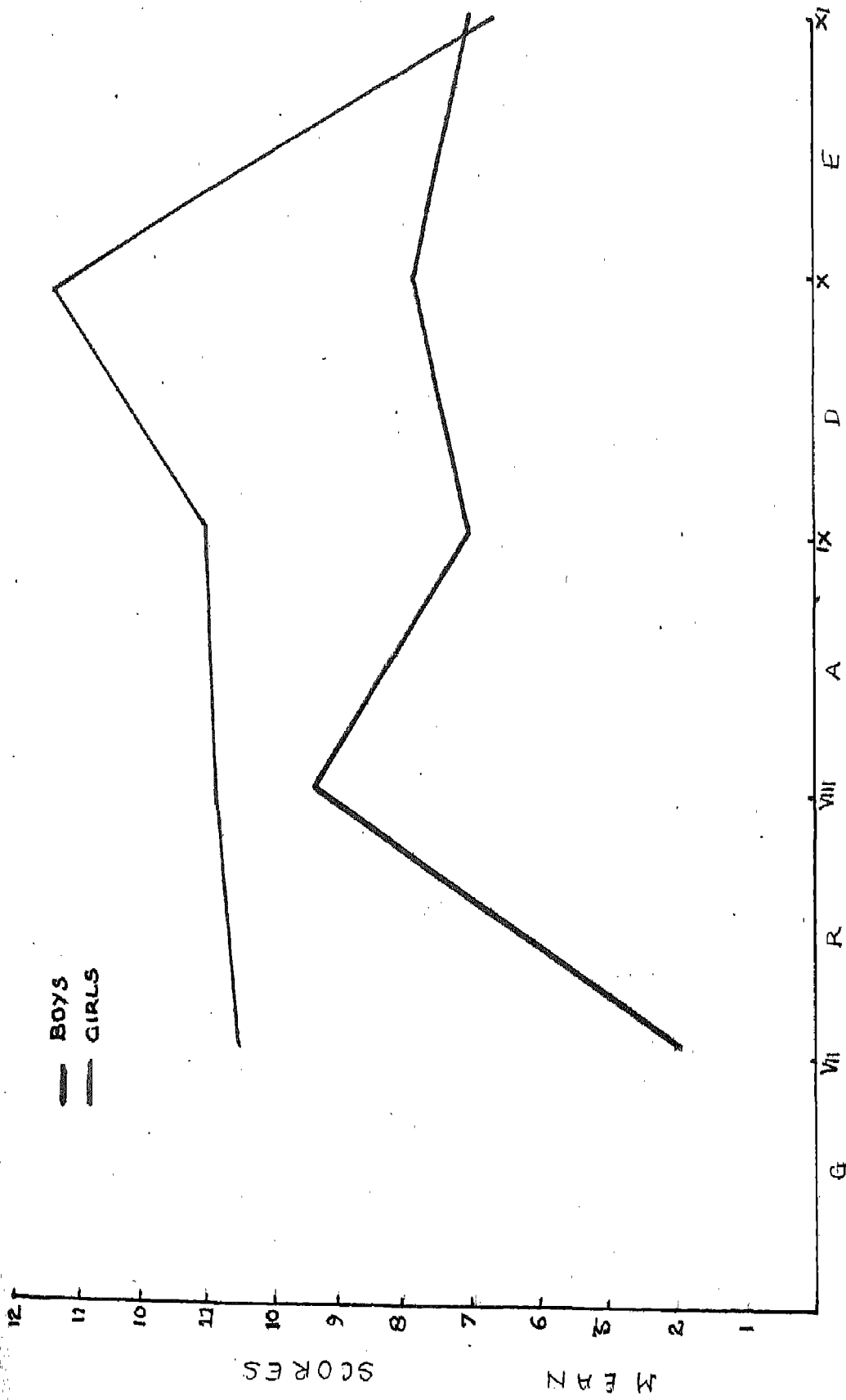


FIG. 5-1. SEX DIFFERENCES ON "CLASSIFICATION" ABILITY

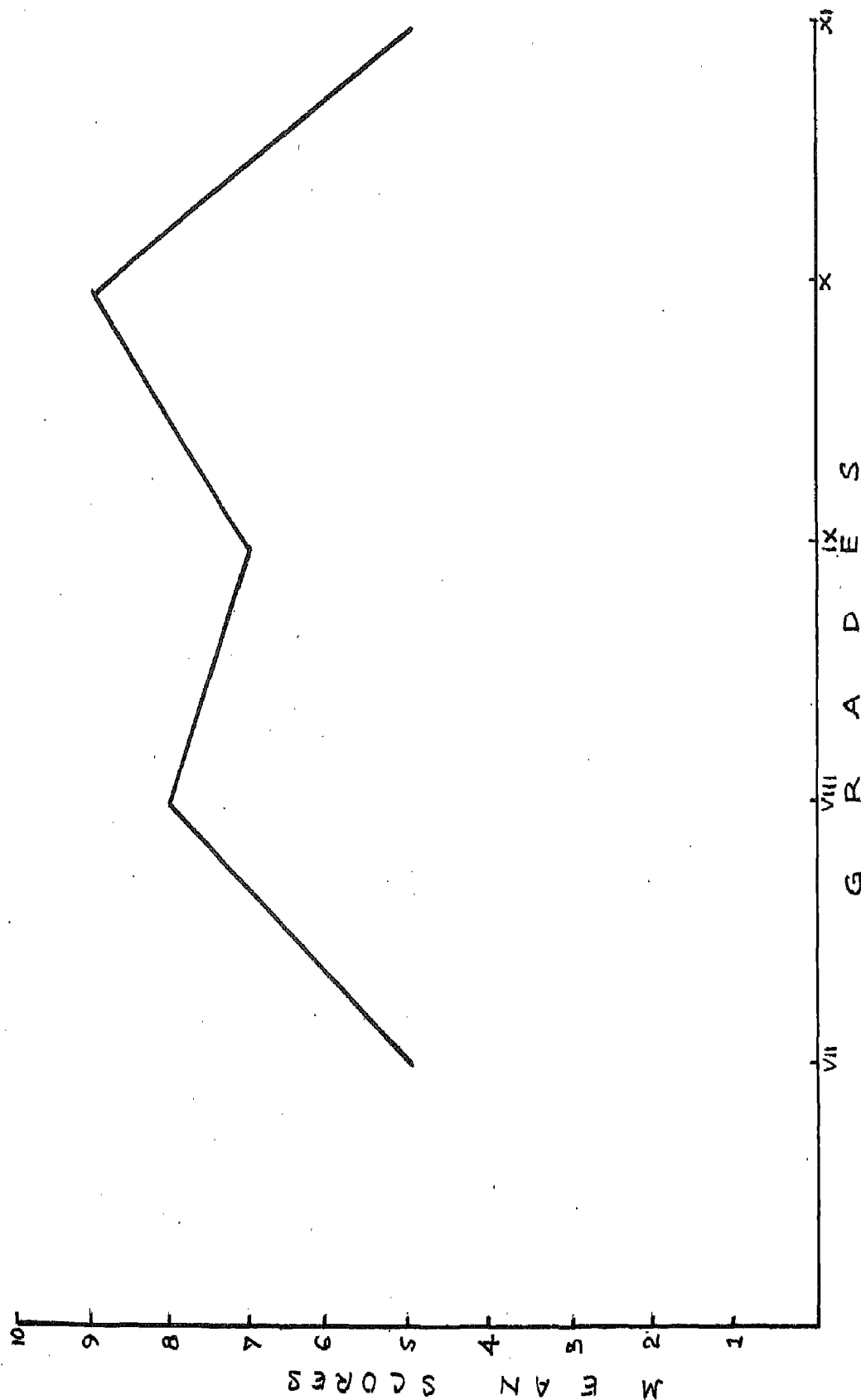


FIG. 5.2- MEAN SCORES ON "CLASSIFICATION" ABILITY

educational developments do not effect it significantly, rather it is affected more by such biological factor as sex and intelligence (which is still considered to be predominantly inherited). However to some extent persistence and self sufficiency (which may be inherited to some extent) also were found to be contributory factors in problem solving ability of classification. Other personality qualities did not seem to affect it to any significant extent.

As revealed by the different weightages found for various independent variables in the regression equation with the problem solving ability under consideration as the dependent variable, sex seems to be the almost deciding factor for this ability.

RELATIONSHIP OF INDEPENDENT VARIABLES WITH THE
PROBLEM SOLVING ABILITY OF "GROUPING OF THOUGHT"

The relevant correlations between the independent variables and the problem solving ability under consideration viz. 'Grouping of thought' are given in the Table 5.3.

TABLE 5.3

CORRELATION BETWEEN THE PROBLEM SOLVING ABILITY OF
"GROUPING OF THOUGHT" AND THE FOLLOWING VARIABLES
(N = 119)

1.	Class	.050354
2.	Sex	.677039**
3.	Reserved, detached/warm hearted outgoing	-.058957
4.	Intelligence	.304571**
5.	Emotional Stability	-.094657
6.	Undemonstrative studgy/excitable, demanding	-.03796
7.	Obedient, mild/assertive aggressive	-.193589*
8.	Sober serious/enthusiastic, heedless	.101033
9.	Desregards rules, expedient/ moralistic, persistent.	.135966
10.	Shy timid/adventurous socially bold	.086172
11.	Tough minded/tenderminded.	.176837*
12.	Zestful, likes group actions/ circumspect, individualism	-.003608
13.	Self assured, secure/apprehensive, insecure.	-.003608
14.	Socially group dependent/self- sufficient.	.143295
15.	Uncontrolled, follows own urges/ controlled, self disciplined.	-.082409
16.	Relaxed unfrazustrated/tense- frazustrated.	.067432

** Significant at .01 level

* Significant at .05 level

From the above table the following conclusions can be drawn.

1. Ability of "grouping of thought" is significantly correlated with.

- | | |
|------------------------------------|----------------|
| i- Sex | (at .01 level) |
| ii- Intelligence | (at .01 level) |
| iii- Mildness (Conformity) | (at .05 level) |
| and iv- Sensitiveness in behaviour | (at .05 level) |

2. Ability of 'grouping' of thought is moderately related to 'apprehensiveness'. Correlation between them is not significant, even at .05 level, however it is very close to the significant figure of .174 (at .05 level).

3. In the regression equation with the ability of grouping of thought as the dependent variable, sex has the highest weightage. No other variable seems to be so potent. These conclusions may be interpreted as follows.

1. Ability of "grouping of thought" seems to be predominantly governed by such inherited factors as sex and intelligence. It does not seem to be influenced by grade level or age level (See Figure 5.3). Further analysis of the data showed that females are better than males on this ability (See Figure 5.4).

2. ^{Conforming} Assertive type of children and children showing sensitivity in their behaviour have better ability of grouping of thought.

3- Apprehensive individuals also to some extent are better placed on the ability of 'grouping of thought'.

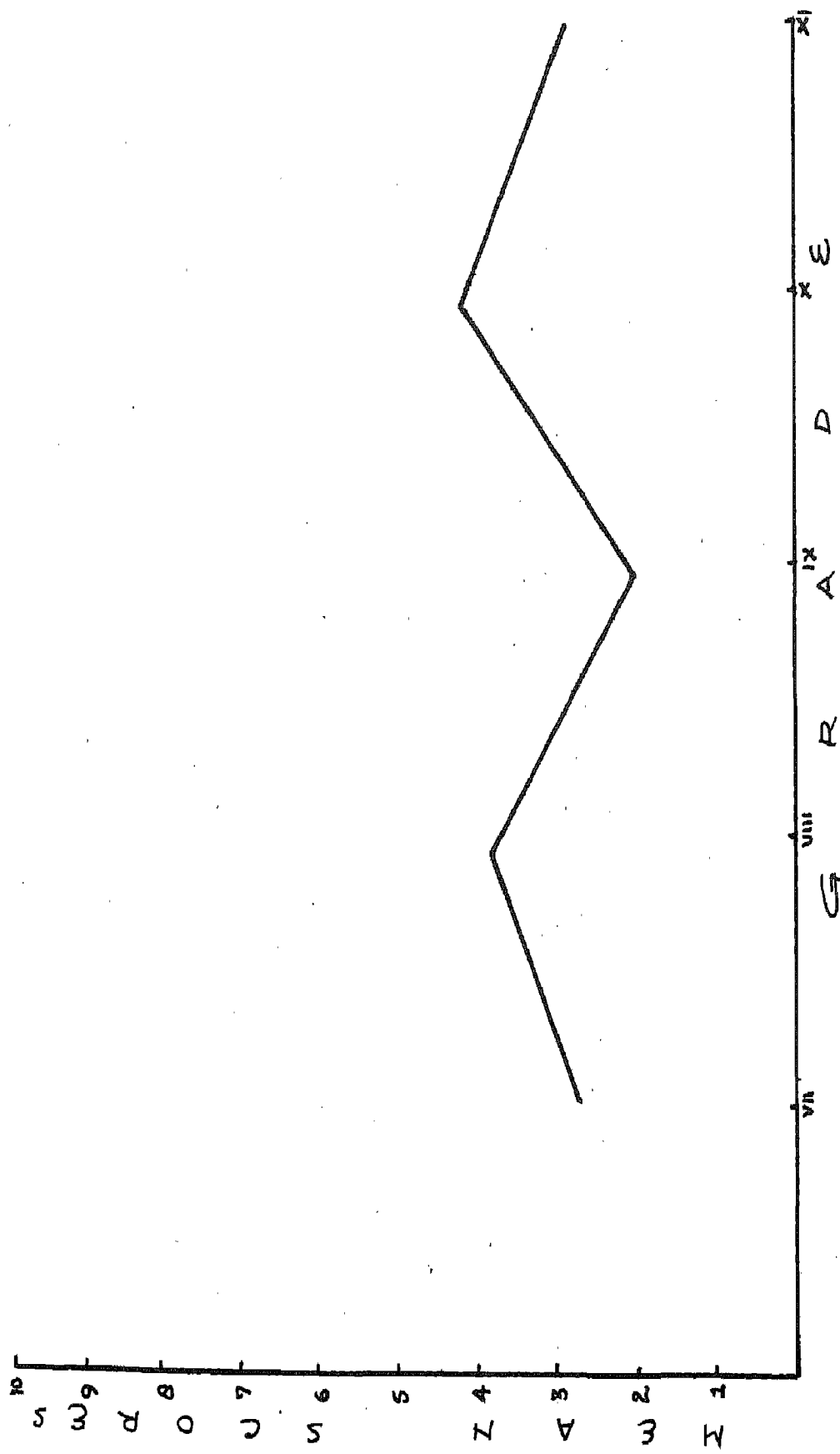


Fig 5.3- MEAN SCORES ON GROUPING OF THOUGHT ABILITY

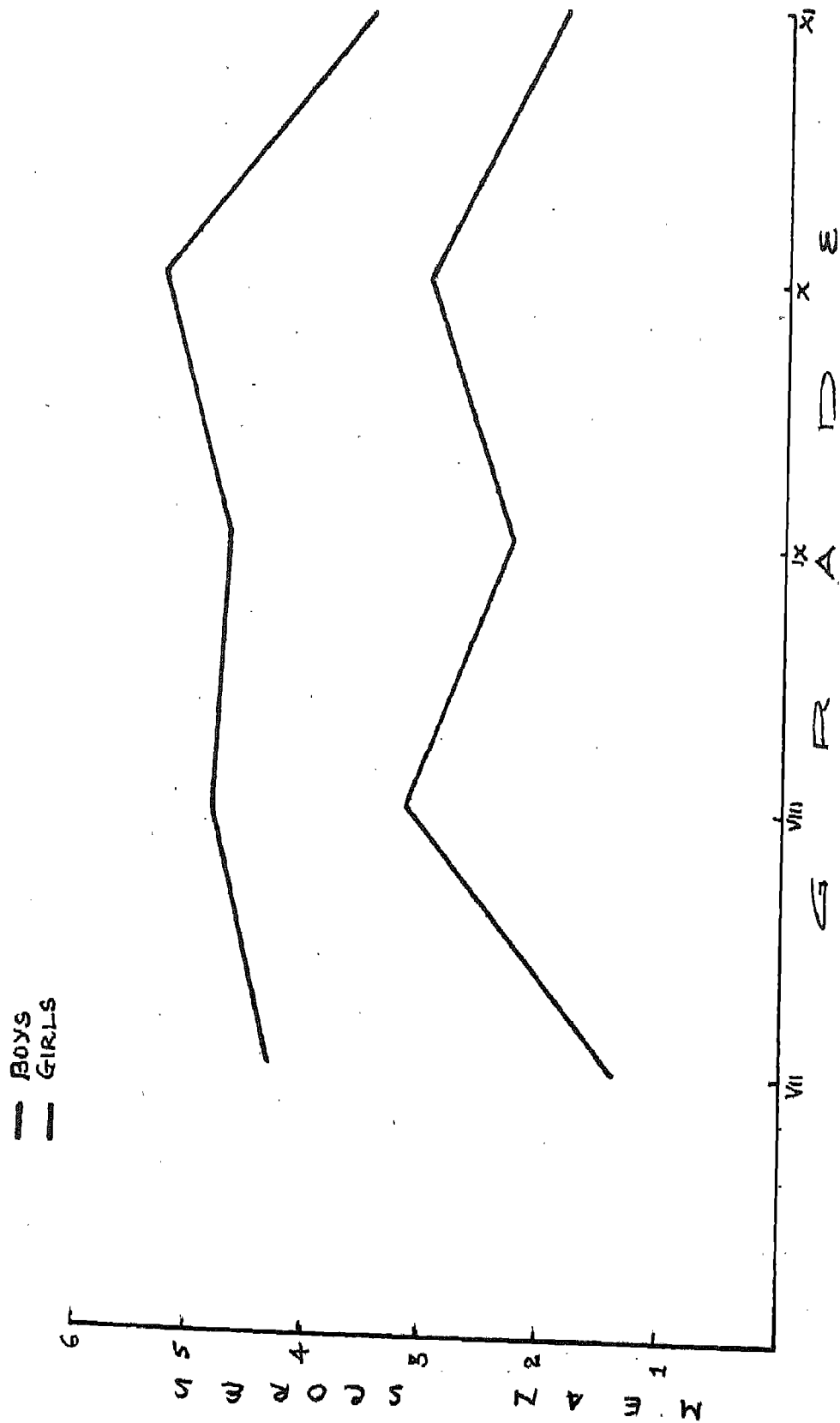


FIG 5.4.- SEX DIFFERENCES ON 'GROUPING OF THOUGHT' ABILITY

4. As revealed by the weightages on the regression equation sex seems to be the most deciding factor for the ability of grouping of thought.

RELATIONSHIP OF INDEPENDENT VARIABLES WITH THE PROBLEMS SOLVING ABILITY OF "GENERALISATION WITH ARITHMETICAL AND ALGEBRAIC SYMBOLS".

Relevant correlations between such independent factors as grade, sex, and fourteen personality characteristics included in the present study, and the problem solving ability of "generalisation with arithmetical and algebraic symbols" are given in the Table 5.4.

TABLE 5.4

CORRELATIONS BETWEEN THE PROBLEM SOLVING ABILITY OF
GENERALIZATION WITH ARITHMETICAL AND ALGEBRAIC
SYMBOLS AND THE FOLLOWING VARIABLES (N=175)

1.	Class	.424927**
2.	Sex	.329269**
3.	Reserved, detached/warm hearted outgoing	.112713
4.	Intelligence	.452357**
5.	Emotional Stability	-.086644
6.	Undemonstrative study/excitable, demanding	-.123569
7.	Obedient, mild/assertive aggressive	-.229794**
8.	Sober serious/enthusiastic, heedless	.049466
9.	Desregards rules, expedient/ moralistic, persistent.	.317497**
10.	Shy timid/adventurous socially bold	-.067623
11.	Tough minded/tenderminded.	.131576
12.	Zestful, likes group actions/ circumspect, individualism.	-.019669
13.	Self assured, secure/apprehensive, insecure	-.028899
14.	Socially group dependent/self- sufficient.	.098851
15.	Uncontrolled, follows own urges/ controlled, self disciplined.	.147239
16.	Relaxed unfrustrated/tense- frustrated. (Ergic tension)	.185188*

** Significant at .01 level

* Significant at .05 level

Following conclusions may be drawn from the entries in the Table 5.4.

1. Ability of generalisation with arithmetical and algebraic symbols seems to be significantly related to

i- Grade	(at .01 level)
ii- Sex	(at .01 level)
iii-Intelligent	(at .01 level)
iv- Mild (conformity)	(at .01 level)
v- Persistent	(at .01 level)
and vi- Relaxed Ergic tension	(at .05 level)

2. Self discipline also seems to be a helping factor in generalisation with arithmetic and algebraic symbols. Correlation between these two variables is not significant even at .05 level of significance but is quite close to the figure significant at .05 level.

From the multiple regression equation with "generalisation with arithmetical and algebraic symbols" as dependent variable, highest weights in descending order go to sex, intelligence and grade.

These conclusions can be interpreted as below -

1. The ability of generalisation with arithmetical and algebraic symbols increases with age and educational development. (See Figure 5.5.).

2. Females are better than males on the ability of generalisation with arithmetical and algebraic symbols (See.Figure 5.6).

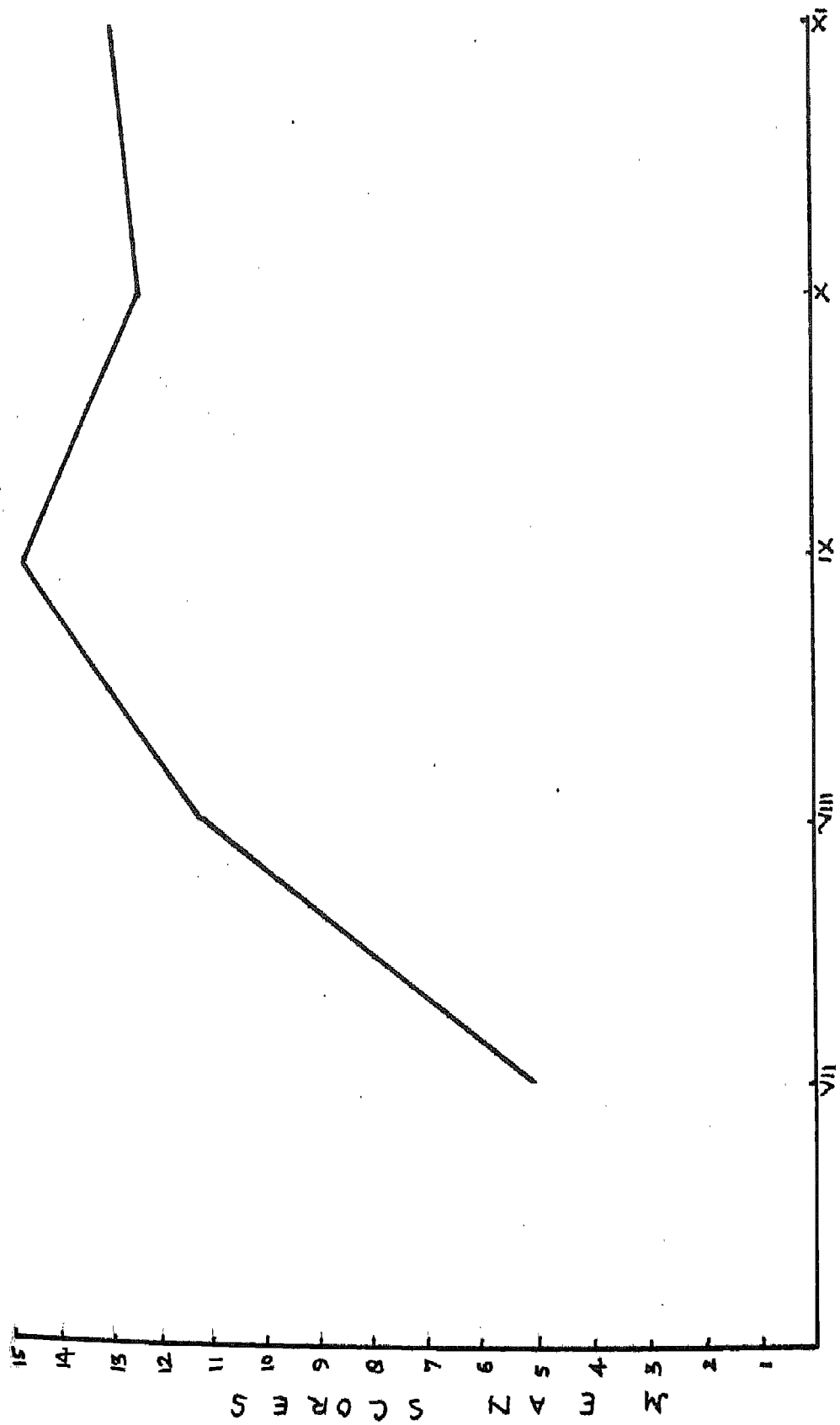


Fig 5.5 - MEAN SCORES ON 'GENERALISATION WITH ARITHMETIC AND ALGEBRAIC SYMBOLS' ABILITY

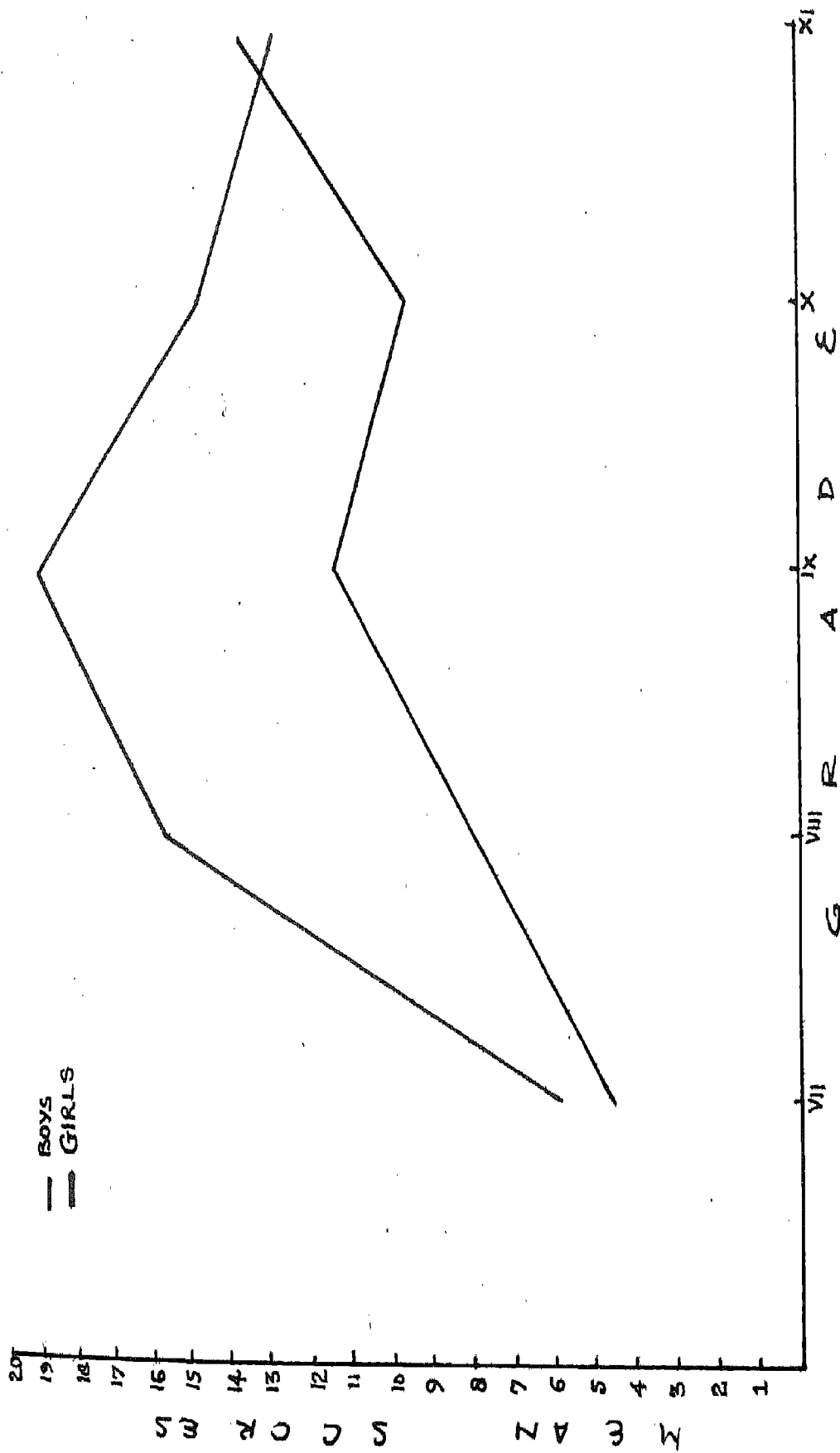


Fig. 5.6 - SEX DIFFERENCES ON 'GENERALISATION WITH ARITHMETIC AND ALGEBRAIC SYMBOLS' ABILITY

3. Intelligent, mild and ^{tense} relaxed but persistent children have better ability of generalisation with arithmetical and algebraic symbols.

3- Self discipline also seem to be a facilitating personality trait, in the generalisation with arithmetical and algebraic symbols, though not to such an extent as the above factors.

5. Most important factor for the ability under consideration is the sex, followed by intelligence and grade. Thus biological factors seem to be the most potent in deciding the nature of this ability. Of course inherited factor like intelligence is also important and much more than educational experiences and age.

RELATIONSHIP BETWEEN THE INDEPENDENT VARIABLES
AND THE PROBLEM-SOLVING ABILITY OF
"PERMUTATION AND COMBINATION"

Table 5.5 provides the necessary data to analyse the relationship between variables related to the personality traits, sex and grade and the problem solving ability of permutation and combination.

TABLE 5.5

CORRELATIONS BETWEEN THE PROBLEM SOLVING ABILITY OF
"PERMUTATION AND COMBINATION" AND THE FOLLOWING
VARIABLES (N = 119)

1.	Class	.262364**
2.	Sex	.308483**
3.	Reserved, detached/warm hearted outgoing	-.059172
4.	Intelligence	.335175**
5.	Emotional Stability	-.027939
6.	Undemonstrative study/ excitable, demanding	-.064134
7.	Obedient, mild/assertive aggressive	-.151631
8.	Sober serious/enthusiastic, heedless	-.023301
9.	Desregards rules, expedient/ moralistic, persistent	-.007891
10.	Shy timid/adventurous socially bold	-.020938
11.	Tough minded/tenderminded.	.021787
12.	Zestful, likes group actions/ circumspect, individualism.	.044736
13.	Self assured, secure/ apprehensive, insecure.	-.172526
14.	Socially group dependent/ self-sufficient.	.047822
15.	Uncontrolled, follows own urges/ controlled, self disciplined.	-.033978
16.	Relaxed unfrustrated/tense- frustrated.	.131868

** Significant at .01 level

Following conclusions may be drawn from this table.

1. The ability of permutation and combination is significantly correlated with
 - i. Grade (at .01 level)
 - ii. Sex (at .05 level)
 - and iii. Intelligence (at .01 level)
2. The ability of permutation and combinations is moderately correlated with self-assurance. The correlation between these two variables were found to be not significant even at .05 level, however it is very close to the significant figure i.e. .174, at .05 level.
3. Other personality variables were not found to be contributing towards the problem solving ability of permutation and combination.

Besides the above conclusions in the multiple regression equation with the ability for permutation and combination as dependent variable the highest weightages go to in descending order, to sex, intelligence and grade.

These conclusions indicate the following characteristics of the ability of permutation and combination.

- 1- The ability of permutation and combination is a developmental ability which increase with age and grade level (See Figure 5.7).

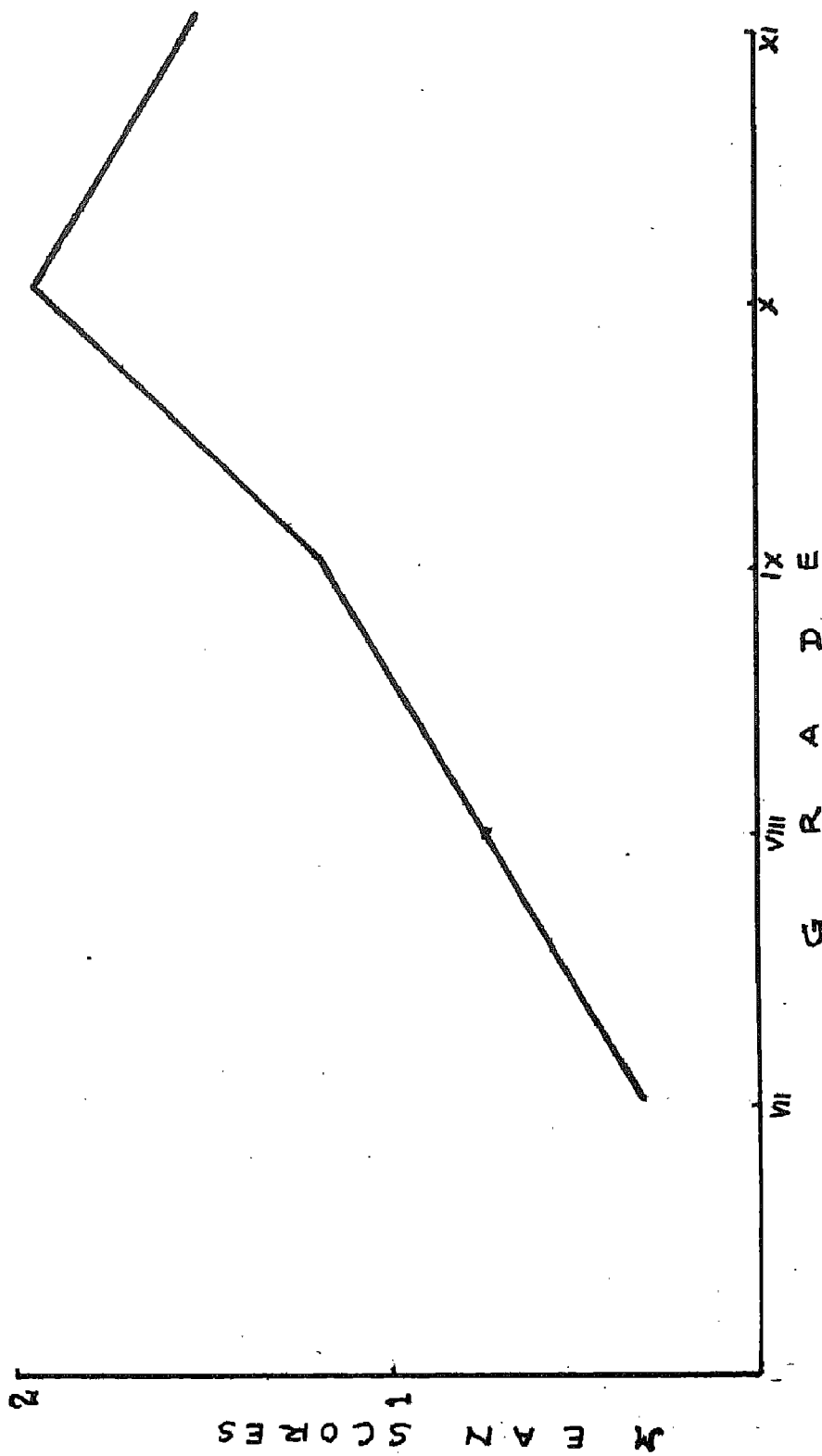


Fig 5.7- MEAN SCORES ON PERMUTATION AND COMBINATION ABILITY.

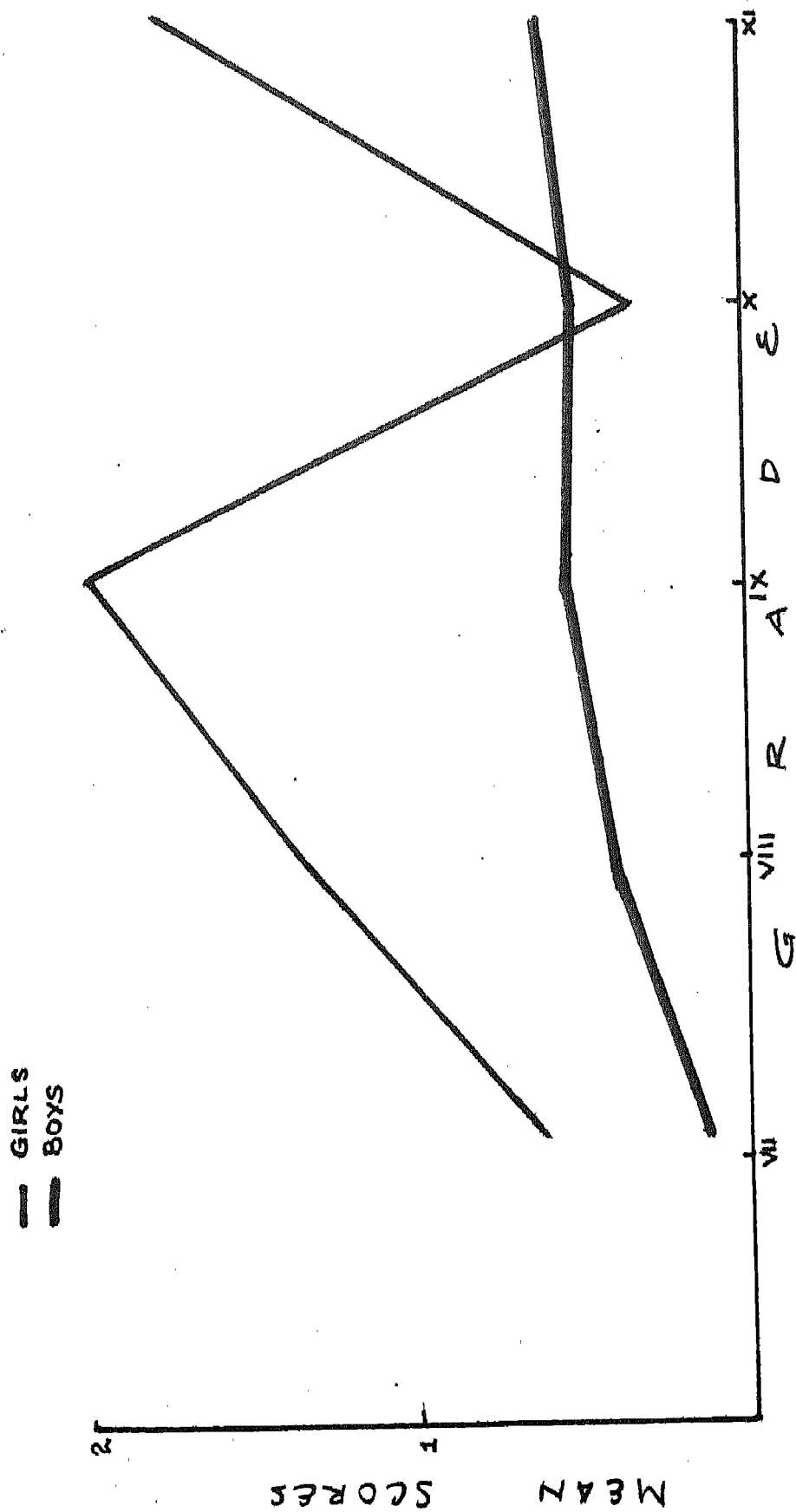


Fig 5.8 - SEX DIFFERENCES ON 'PERMUTATION AND COMBINATION' ABILITY

TABLE 5.6

CORRELATIONS BETWEEN THE PROBLEM SOLVING ABILITY
OF "RATIO AND PROPORTION" AND THE FOLLOWING
VARIABLES (N = 119)

1-	Class	.446847**
2-	Sex	.138849
3-	Reserved, detached/warm hearted outgoing	.111850
4-	Intelligence	.175880*
5-	Emotional Stability	.037719
6-	Undemonstrative study/ excitable, demanding	-.061411
7-	Obedient, mild/assertive aggressive	.118647
8-	Sober serious/enthusiastic, heedless	-.012286
9-	Desregards rules, expedient/ moralistic, persistent	.144851
10-	Shy timid/adventurous socially hold.	.036308
11-	Tough minded/tenderminded	.103492
12-	Zestful, likes group actions/ circumspect, individualism (reflective)	.225138**
13-	Self assured, secure/ apprehensive, insecure	.039913
14-	Socially group dependent/ self-sufficient	.056167
15-	Uncontrolled, follows own urges/controlled, self disciplined	.034910
16-	Relaxed unfrustrated/tense- frustrated	.015199

** Significant at .01 level

* Significant at .05 level

Following conclusions can be drawn from the Table 5.6.

1- The ability of understanding the concept of ratio and proportion is significantly related to

1- Grade (at .01 level)

ii- Intelligence (at .05 level)

and iii- Restrained and reflective thinking (at .01 level)

2- The ability to work out the problems on ratio and proportion is moderately related to the personality quality of persistence. The correlation between these two variables was not found to be significant even at .05 level however it is ^{quite} very close to the significant figure at .05 level i.e. .174.

3- Other personality variables and sex were not found to be contributing towards this ability in the present study (See Figure 5.9)

Besides these conclusions, among the different weightages found for the independent variables on the regression equation with the ability to understand the concept of ratio and proportion as dependent variable, highest in order of merit are on grade and individualism. Analysis of the relevant data and the above conclusions arrived at from this analysis bring out the following characteristics of the ability to solve problems based on the concept of ratio and proportion, as revealed by the present study.

1- Ability to solve problems on ratio and proportion and increases with age and educational experiences.

(See Figure 5.10).

2- Experience and personality qualities seem to be better indicators of this ability than the inherent qualities of an individual like intelligence or sex.

3- There seems to be no sex differences on this ability (See Figure 5.9).

4- Persistence also seems to help, to some extent, in developing this ability.

5- Educational experiences seem to be the most important factor in shaping the ability to understand the concept of ratio and proportion, followed by the reflective nature of the individual.

RELATIONSHIP BETWEEN 14-PERSONALITY TRAITS, SEX
AND GRADE AND THE PROBLEM SOLVING ABILITY OF
"FORMULATING PROBING QUESTIONS"

Correlations worked out on the basis of the accumulated data and related to the problem solving ability of formulating probing questions, are given in the Table 5.7.

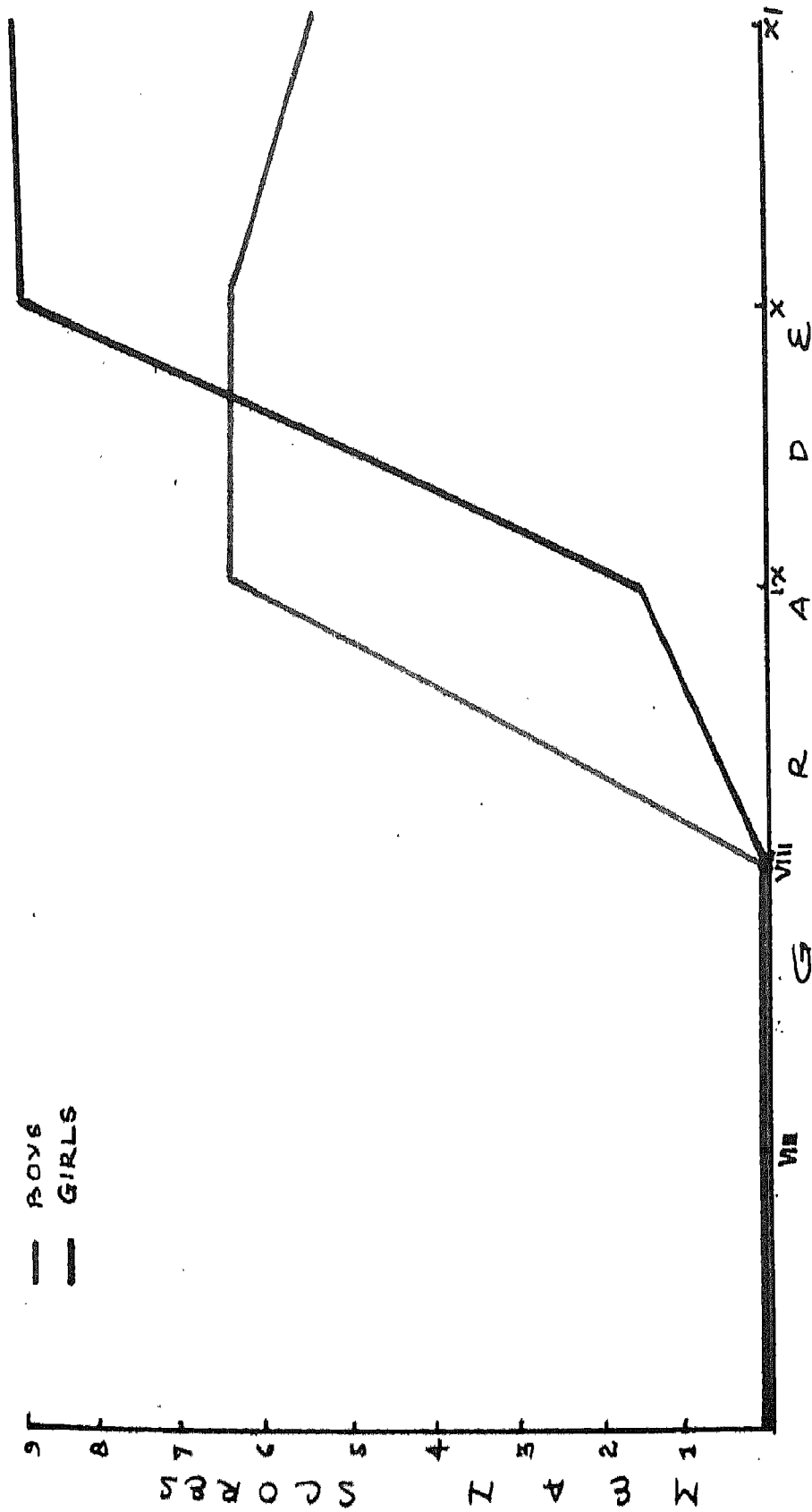


Fig 5.9 - SEX DIFFERENCES ON 'RATIO AND PROPORTION' ABILITY

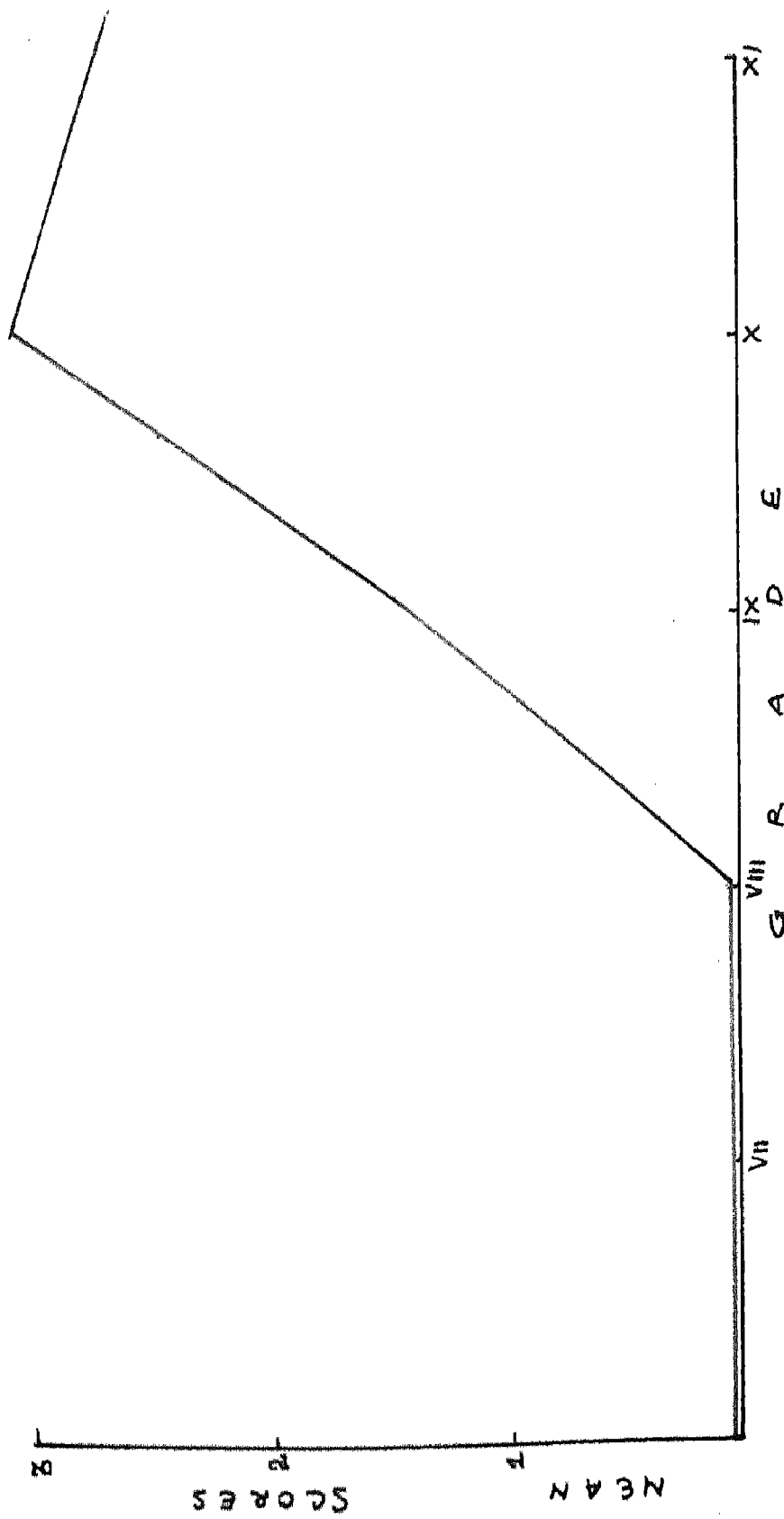


Fig 5.10 - MEAN SCORES ON 'RATIO AND PROPORTION' ABILITY

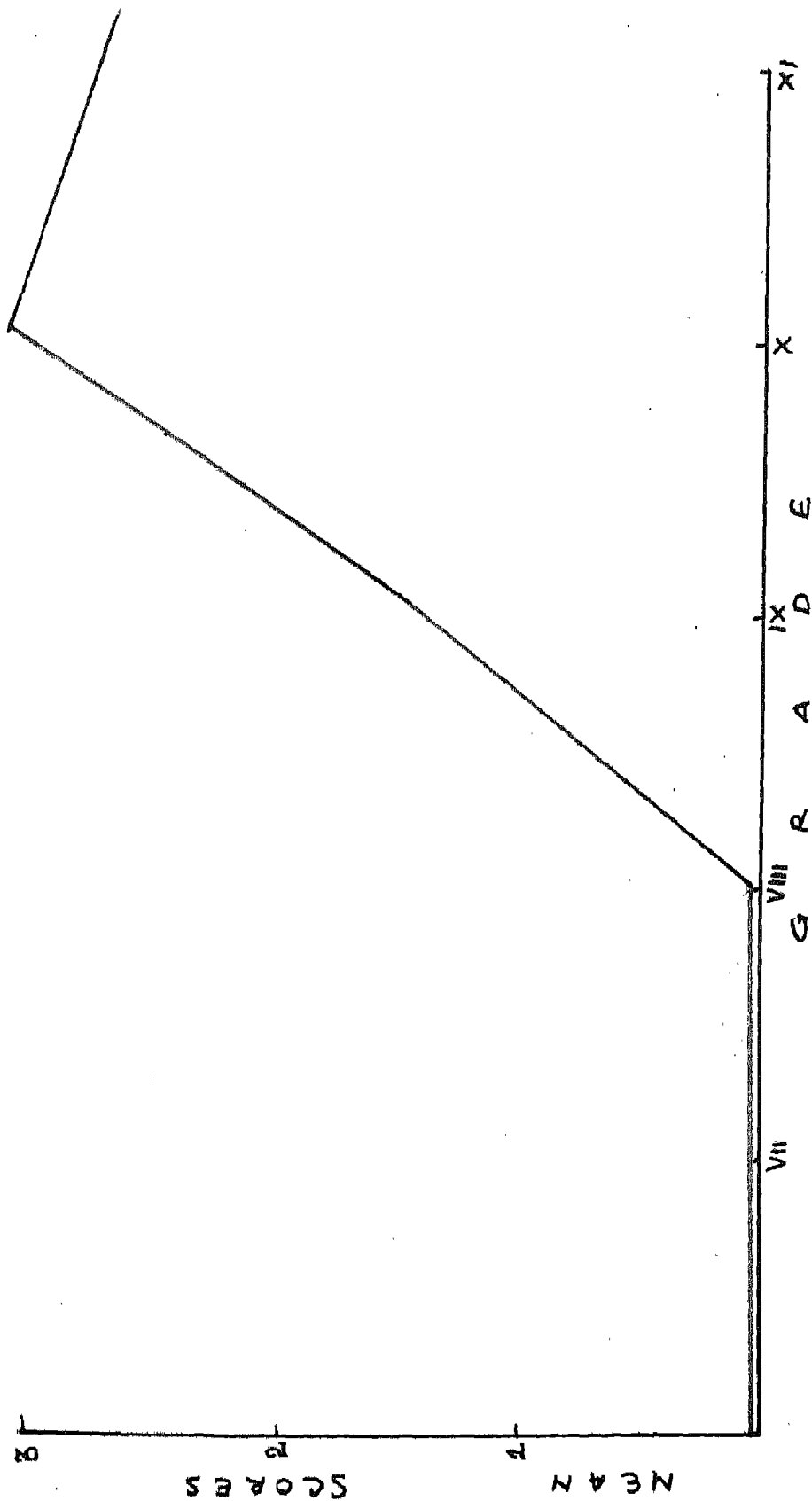


Fig 5.10 - MEAN SCORES ON 'RATIO AND PROPORTION' ABILITY

TABLE 5.8

CORRELATIONS BETWEEN THE PROBLEM SOLVING ABILITY
OF "FORMULATING PROBLEM QUESTIONS" AND THE
FOLLOWING VARIABLES (N=136)

1-	Class	.296693**
2-	Sex	.607073**
3-	Reserved, detached/warm hearted outgoing	.001370
4-	Intelligence	.291804**
5-	Emotional Stability	-.027710
6-	Undemonstrative studgy/ excitable, demanding	-.178794*
7-	Obedient, mild/assertive aggressive	-.131615
8-	Sober serious/enthusiastic, heedless	.141951
9-	Desregards, rules, expedient/ moralistic, persistent	.216843**
10-	Shy timid/adventurous socially bold.	.158212
11-	Tough minded/tenderminded.	.132223
12-	Zestful likesgroup actions/ circumspect, individualism.	-.113999
13-	Self assured, secure/apprehensive, insecure.	-.175192*
14-	Socially group dependent/self sufficient	.075624
15-	Uncontrolled, follows own urges/ controlled, self-disciplined.	.033078
16-	Relaxed unfrustrated/tense- frustrated	.107974

** Significant .01 level

* Significant .05 level

The following conclusions can be drawn from the Table 5.7.

1- The ability to formulate probing questions were found to be significantly related to the following independent variables in the present study.

- | | |
|---|----------------|
| i- Grade | (at .01 level) |
| ii- Sex | (at .01 level) |
| iii-Intelligence | (at .01 level) |
| iv- Undemonstrative and
deleberate personality | (at .05 level) |
| v- Persistence | (at .01 level) |
| and vi- Self-assurance | (at .05 level) |

2- Correlation between the personality traits of being 'socially bold' and ability to formulate probing questions ^{was} also considerable. Although this correlation of .158212 is not even significant at .05 level but is quite close to be significant figure of .174 at .05 level.

On the multiple regression equation, with formulating probing questions as dependent variable, highest weightage goes to sex followed by grade.

These conclusions from the analysis of the data reveal the following characteristics of the ability to formulate probe^{ing} questions, in the present study.

- 1- The ability to formulate probing questions is affected by both biological and inherited factors and the acquired personality factors.
- 2- It is a developmental ability which increases with educational experiences and age. (See Figure 5.11).
- 3- Girls seem to be better on this ability particularly during the ^{earlier} certain ages (See Figure 5.12)
- 4- Besides intelligence, this ability seem to be affected by such personality qualities of the individual as persistence' and self-assurance'.
- 5- Socially hold individuals also seem to be better placed on this ability.
- 6- Sex seems again to be the most discriminating factor, followed by educational experience on the ability to formulate probing questions.

RELATIONSHIP BETWEEN THE INDEPENDENT VARIABLES OF PERSONALITY, SEX AND GRADE AND THE PROBLEM SOLVING ABILITY OF INTERPRETATION AND COORDINATION OF INFORMATION.

The relevant data related to the relationship between the fourteen personality factors, sex and grade and the problem solving ability of interpretation and coordination of information, ^{are} summarised in the Table 5.8.

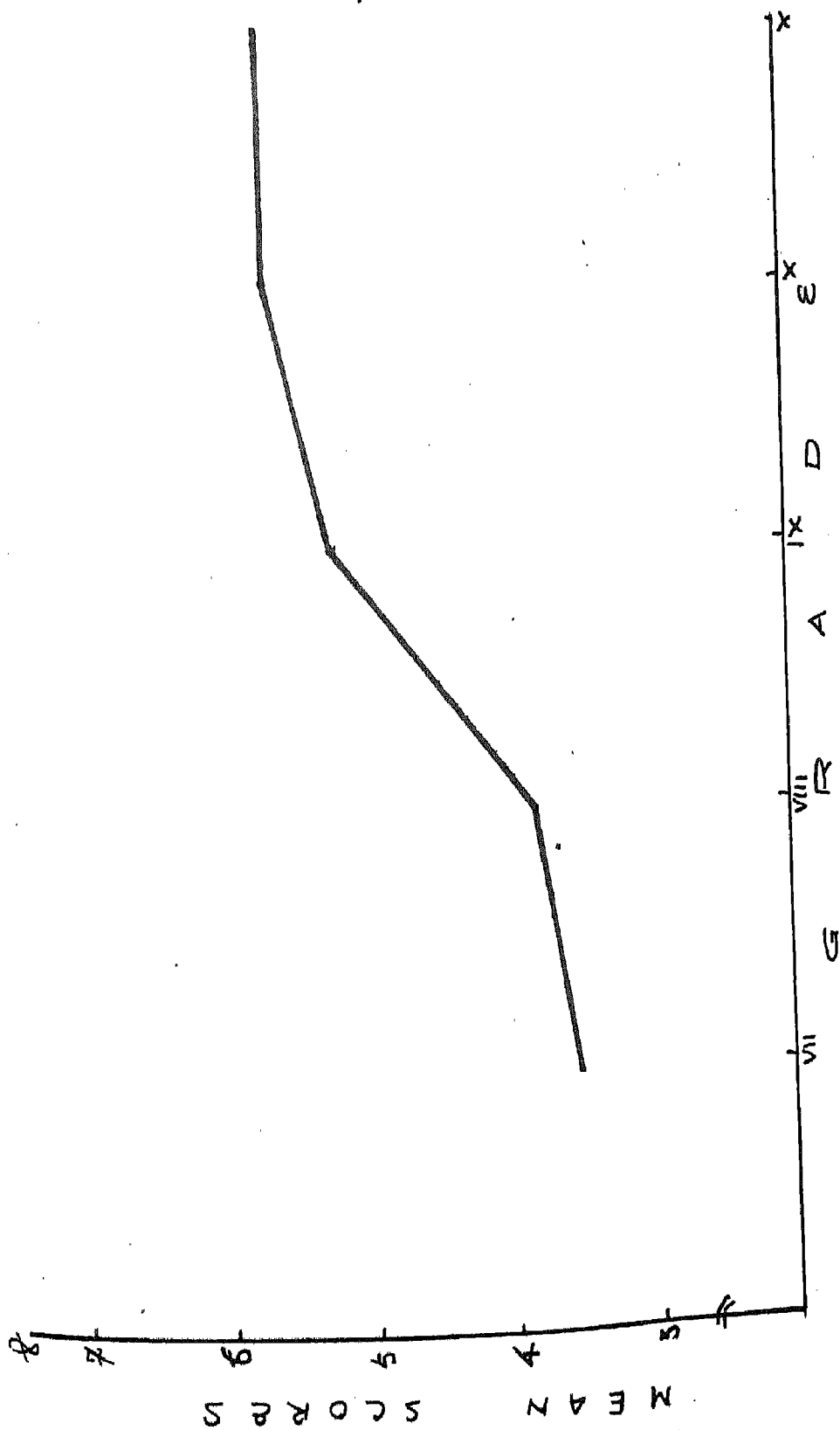


FIG. 5.11 - MEAN SCORES ON 'FORMULATING PROBING QUESTIONS' ABILITY

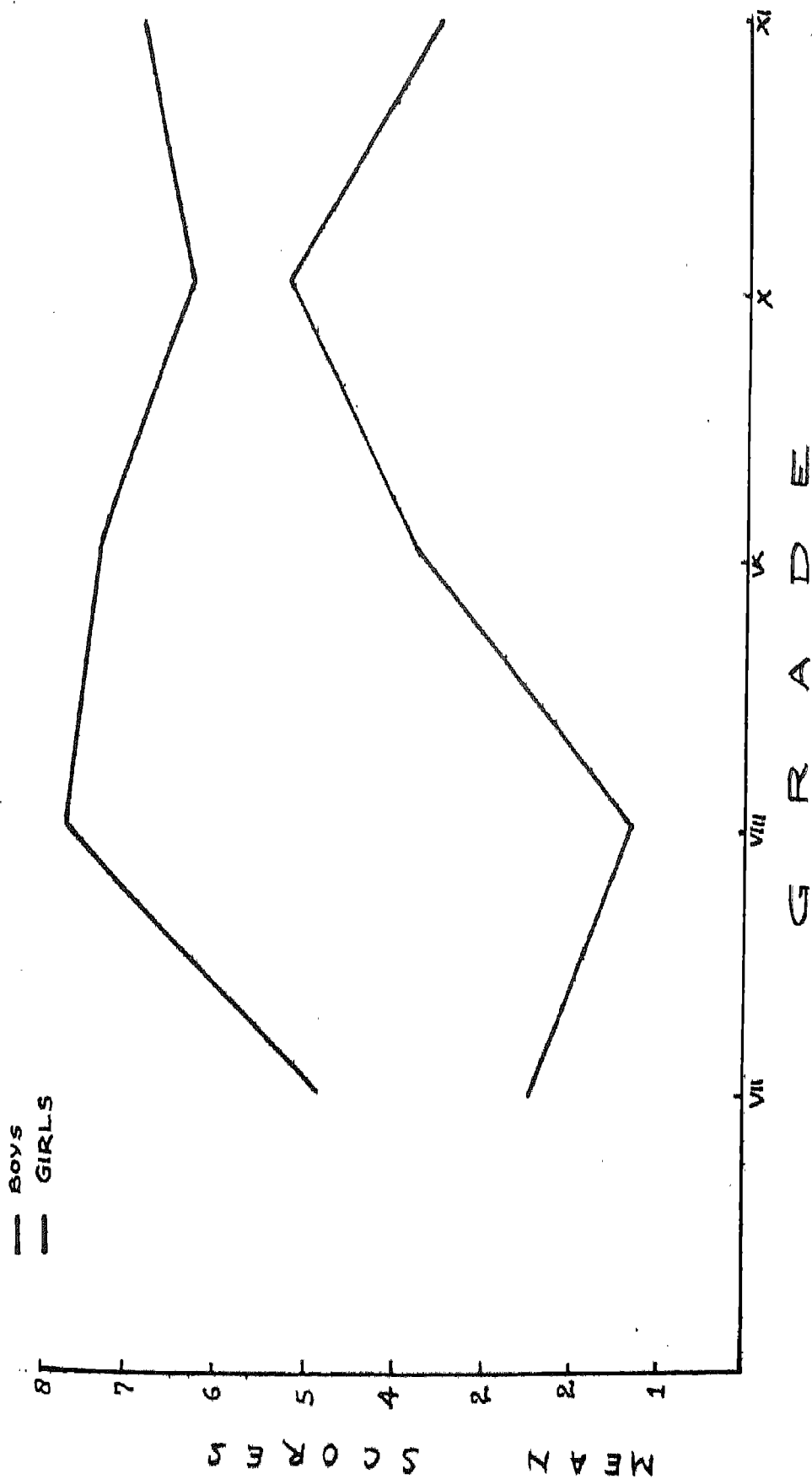


Fig 5.12 - SEX DIFFERENCES ON 'FORMULATING PROBING QUESTIONS' ABILITY

TABLE 5.8

CORRELATION BETWEEN THE PROBLEM SOLVING ABILITY OF
"INTERPRETATION AND COORDINATION OF THE INFORMATION"
AND FOLLOWING VARIABLES (N = 136)

1.	Class	.43160**
2.	Sex	.543916**
3.	Reserved, detached/warm hearted outgoing	.048497
4.	Intelligence	.376947**
5.	Emotional Stability	-.033076
6.	Undemonstrative Studgy/ excitable demanding	-.101835
7.	Obedient, mild/assertive aggressive.	-.097634
8.	Sober serious/enthusiastic, heedless	.161468
9.	Desregards rules, expedient/ moralistic, persistent	.260825**
10.	Shy timid/adventurous socially bold	.124533
11.	Tough minded/tenderminded	.169550*
12.	Zestful likes groups actions/ circumspect, individualism.	-.081841
13.	Self assured, secure/ apprehensive, insecure.	-.020913
14.	Socially group dependent/self sufficient	.064999
15.	Uncontrolled, follows own urges/ controlled, self disciplined.	.065309
16.	Relaxed unfrustrated/tense, frustrated.	.237410**

** Significant at .01 level

From this table it is clear that -

1- The problem solving ability based on interpretation and coordinations of information is significantly correlated to.

1) Grade	(at .01 level)
11) Sex	(at .01 level)
111) Intelligence	(at .01 level)
iv) Persistence	(at .01 level)
v) Extroversion	(at .01 level)
and v) Toughmindedness	(at .05 level)

2. It is moderately correlated with such personality quality as 'soberity and its correlation with this personality quality as indicated in the Table 5.8, was found to be .161468 which is not significant even at .05 level, however it is very close to the figure .168 which is significant at .05 level (with $df = 135$).

On the relevant multiple regression equation with the ability to interpret and coordinate information as the dependent variable the highest weightage goes to sex followed by the grade.

All these facts related to the present study reveal the following characteristics of the ability to interpret and coordinate informations.

1- The ability under consideration is a developmental ability which increases with educational experience and age (see Figure 5.13).

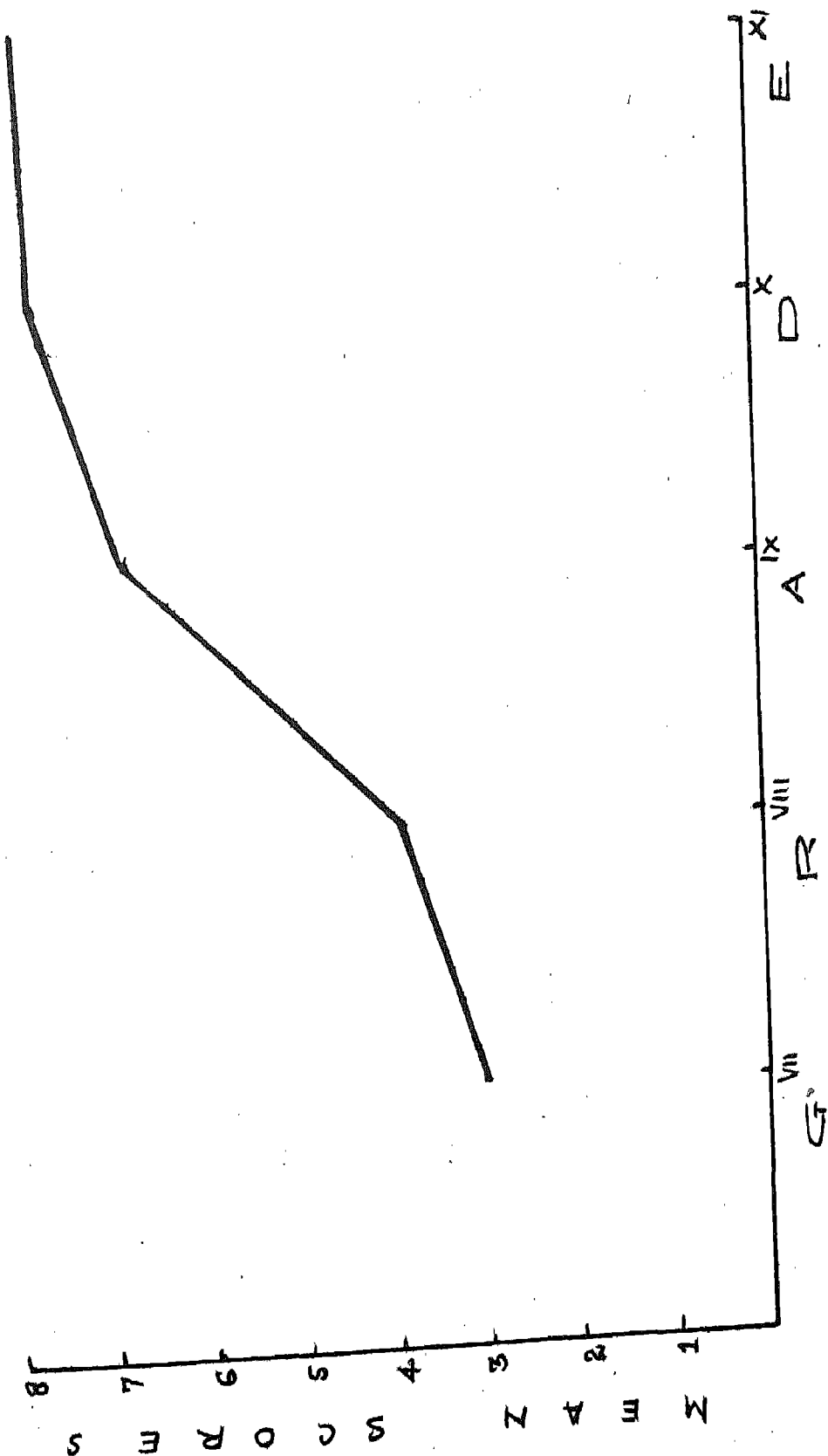


Fig- 5.13- MEAN SCORES ON 'INTERPRETATION AND COORDINATION OF INFORMATION' ABILITY

- 2- It is affected by both biological and inherited factors and the personality factors.
- 3- Girls are better placed on this ability (See Figure 5.14).
- 4- Intelligence, persistent^{tense} and self-relevant (tough-minded) students fare better on those problems which are based on interpretation and coordination of information.
5. Sober students are also more likely to be better on this ability.
6. Sex, followed by grade seem to be the most deciding factors in shaping the ability of interpretation and coordination of information.

RELATIONSHIP BETWEEN PERSONALITY FACTORS, SEX AND GRADE
AND THE PROBLEM SOLVING ABILITY OF "STATING AND TESTING
HYPOTHESIS"

Coorelations related to these personality, sex and grade variables and the problem solving ability of stating and testing hypothesis are given in the Table 5.9.

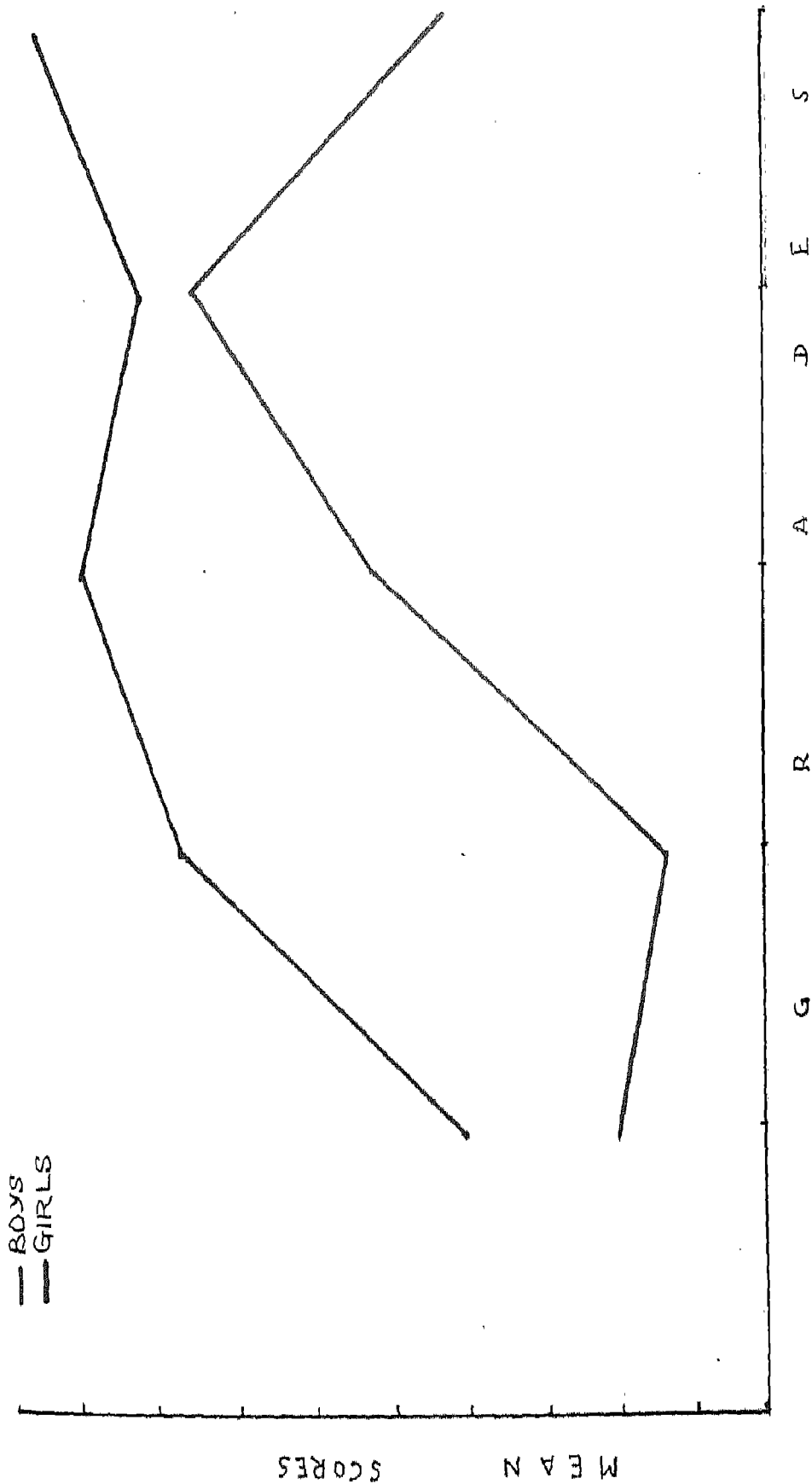


Fig 5.14 - SEX DIFFERENCES ON 'STATING AND TESTING HYPOTHESIS' ABILITY

TABLE 5.9

CORRELATIONS BETWEEN THE PROBLEM SOLVING ABILITY OF
"STATING AND TESTING HYPOTHESIS" AND THE FOLLOWING
VARIABLES (N = 136)

1.	Sex Class	.236305**
2.	Sex	.564808**
3.	Reserved, detached/warm hearted outgoing	.101212
4.	Intelligence	.414366**
5.	Emotional Stability	-.027465
6.	Undemonstrative studgy/ excitable demanding	-.144031
7.	Obedient, mild/assertive aggressive	.019452
8.	Sober serious/enthusiastic, heedless	-.002863
9.	Desregards rules, expedient/ moralistic, persistent.	.258399**
10.	Shy, timid/adventurous socially bold	.075779
11.	Tough minded/tenderminded	.220662**
12.	Zestful likes group actions/ circumspect, individualism.	.141664
13.	Self assured, secure/apprehensive, insecure.	-.056307
14.	Socially group dependent/ self sufficient	.124885
15.	Uncontrolled, follows own urges/ controlled, self discipline	.029684
16.	Relaxed, unfrustrated/those, frustrated.	.124432

** Significant at .01 level

The following conclusions can be drawn from the Table 5.9.

1. The ability of stating and testing hypothesis is significantly related to such independent variables as -

i- Grade (at .01 level)

ii- Sex (at .01 level)

iii-Intelligence (at .01 level)

iv- Persistence (at .01 level)

and v- Sensitiveness in behaviour(at .01 level)

2. To some extent it is related to such personality traits as 'deleberate' and individualism, correlations between the problem solving ability under consideration and these variables are not significant even at .05 level however quite near to the significant figure at this level.

3. Other correlations are not worth considering.

Besides these, different weightages on the multiple regression equation with the ability of stating and testing hypotheses as the dependent variables, the highest weightage in order of ^{merit} meant go to sex and intelligence.

These facts drawn from the present study lead to the following interpretations.

2- The ability of stating and testing hypothesis is affected both by biological and inherited factors and the personality and environmental factors.

- 2- Girls are better placed on this ability particularly in the lower classes (See Figure 5.15).
- 3- It is a developing ability which increases with age and educational experiences (See Figure 5.16)
4. Students who are 'intelligent, persistent and sensitive in their behaviour are better placed on this ability.
5. Out of the significant independent variables, sex, followed by intelligence seem to be the most influencing factors in shaping the ability under consideration.

RELATIONSHIP BETWEEN THE INDEPENDENT PERSONALITY FACTORS, SEX AND GRADE AND THE PROBLEM SOLVING ABILITY OF 'SPACE VISUALISATION'.

The relevant correlations ρ indicating these relationship are given in the Table 5.10.

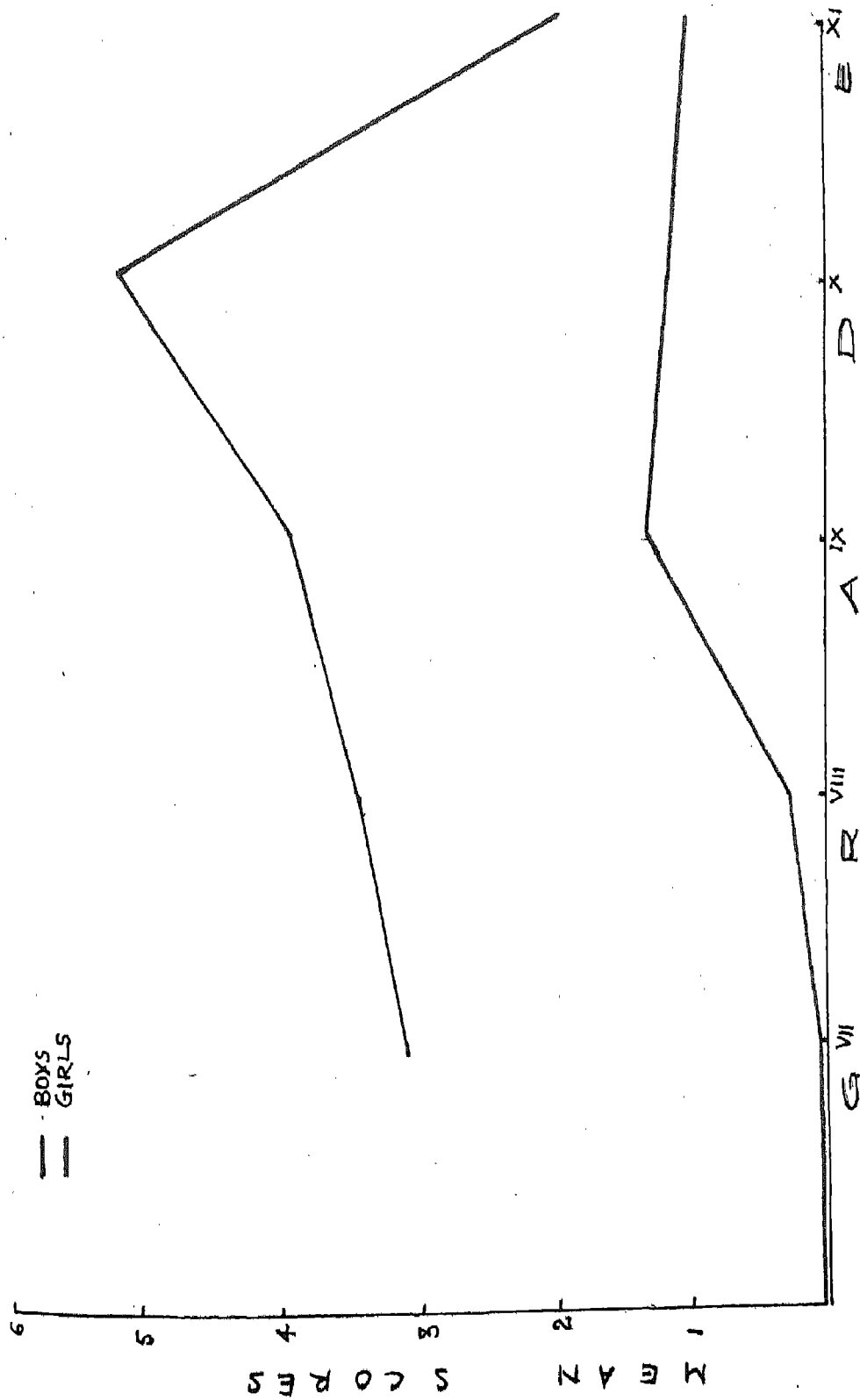


Fig 5.15 - SEX DIFFERENCES ON STATING AND TESTING HYPOTHESIS

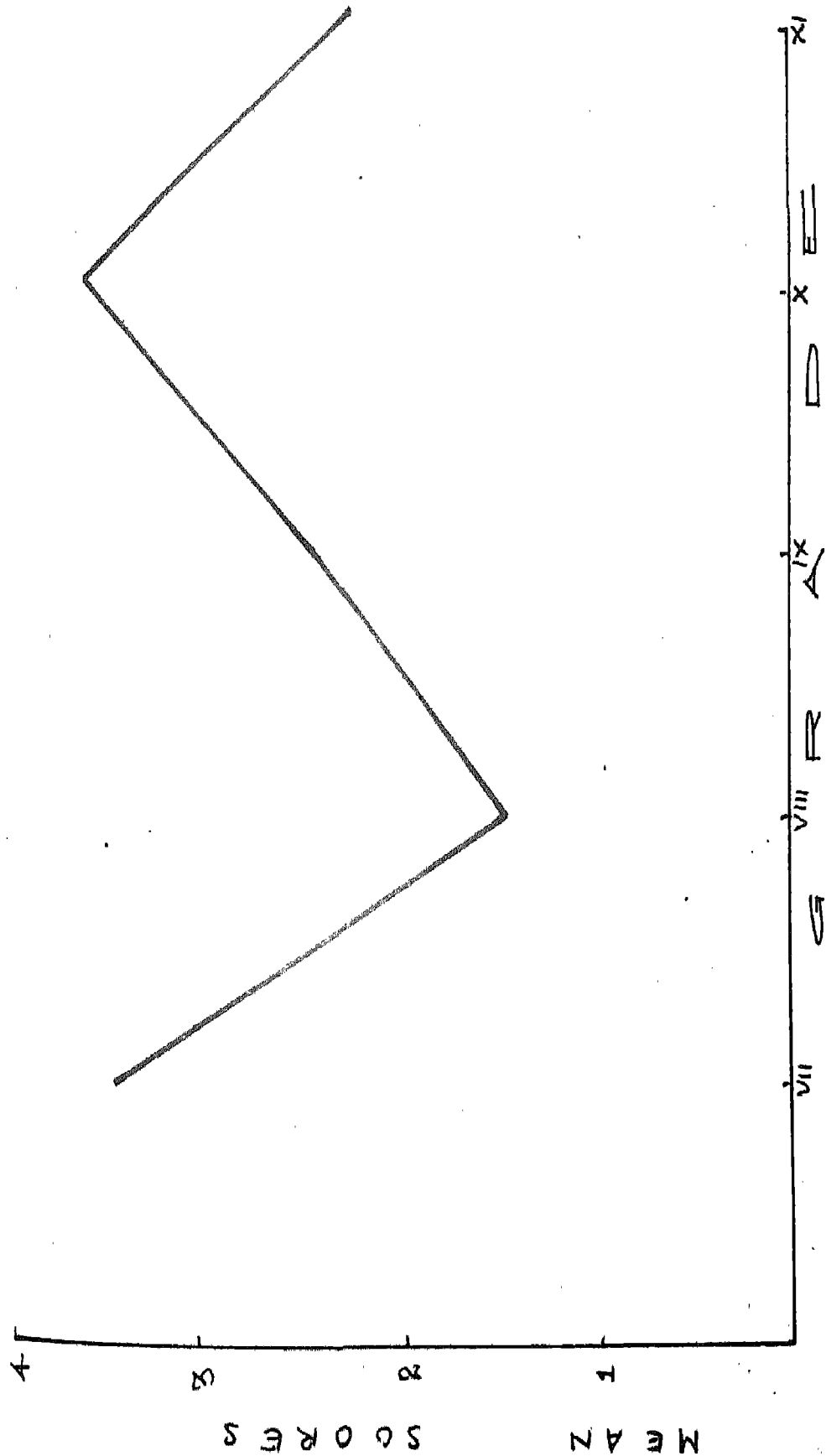


Fig 5.16 - MEAN SCORES ON 'STATING AND TESTING HYPOTHESIS' ABILITY

TABLE 5.10

CORRELATION BETWEEN THE PROBLEM SOLVING OF ABILITY OF
"SPACE VIZUALIZATION" AND THE FOLLOWING VARIABLES
(N = 136)

1.	Class	.267601**
2.	Sex	.581326**
3.	Reserved, detached/warm hearted outgoing	-.058009
4.	Intelligence	.248785**
5.	Emotional Stability	-.073414
6.	Undemonstrative Studgy/ excitable demanding	-.106089
7.	Obedient, mild/assertive aggressive	-.164682*
8.	Sober serious/enthusiastic, heedless	.178144*
9.	Desregars rules, expedient/ moralistic, persistent.	.65955'
10.	Shy timid/adventurous, socially bold	.038652
11.	Tough minded/tenderminded	.049819
12.	Zesful likes group actions/ circumspect, individualism.	-.125863
13.	Self assured, secure/apprehensive, insecure.	-.107884
14.	Socially group dependent/self sufficient.	.111995
155	Uncontrolled, follows own urges/ controlled, self-disciplined.	.023081
16.	Relaxed, unfustrated/tense, frustrated.	.164947*

** Significant at .01 level

* Significant at .05 level

The following conclusions can be drawn from these correlations.

1. There is a significant correlation between the ability of space visualisation and the following independent variables.

i- Grade	(at .01 level)
ii- Sex	(at .01 level)
iii-Intelligence	(at .01 level)
iv- Headlessness and enthusiasm	(at .05 level)
and ~~vi~~ Ergic tension	(at .05 level)

2. Other personality traits do not seem to be related in any significant way with the ability under consideration.

A glance at the multiple regression weightages with the ability for space visualisation as dependent variable found highest weightages shared by in order of ^{merit} merit by sex and grade.

The interpretations which emanate from these conclusions may be summarised as follows.

1- Space visualisation is the ability which develops through educational expences and age. It is a developmental ability (See Figure 5.17).

2- It is affected by inherited and biological factors like intelligence and sex (See Figure 5.18) but also by a number of personality factors. Thus it is a product of heredity and environmental factors.

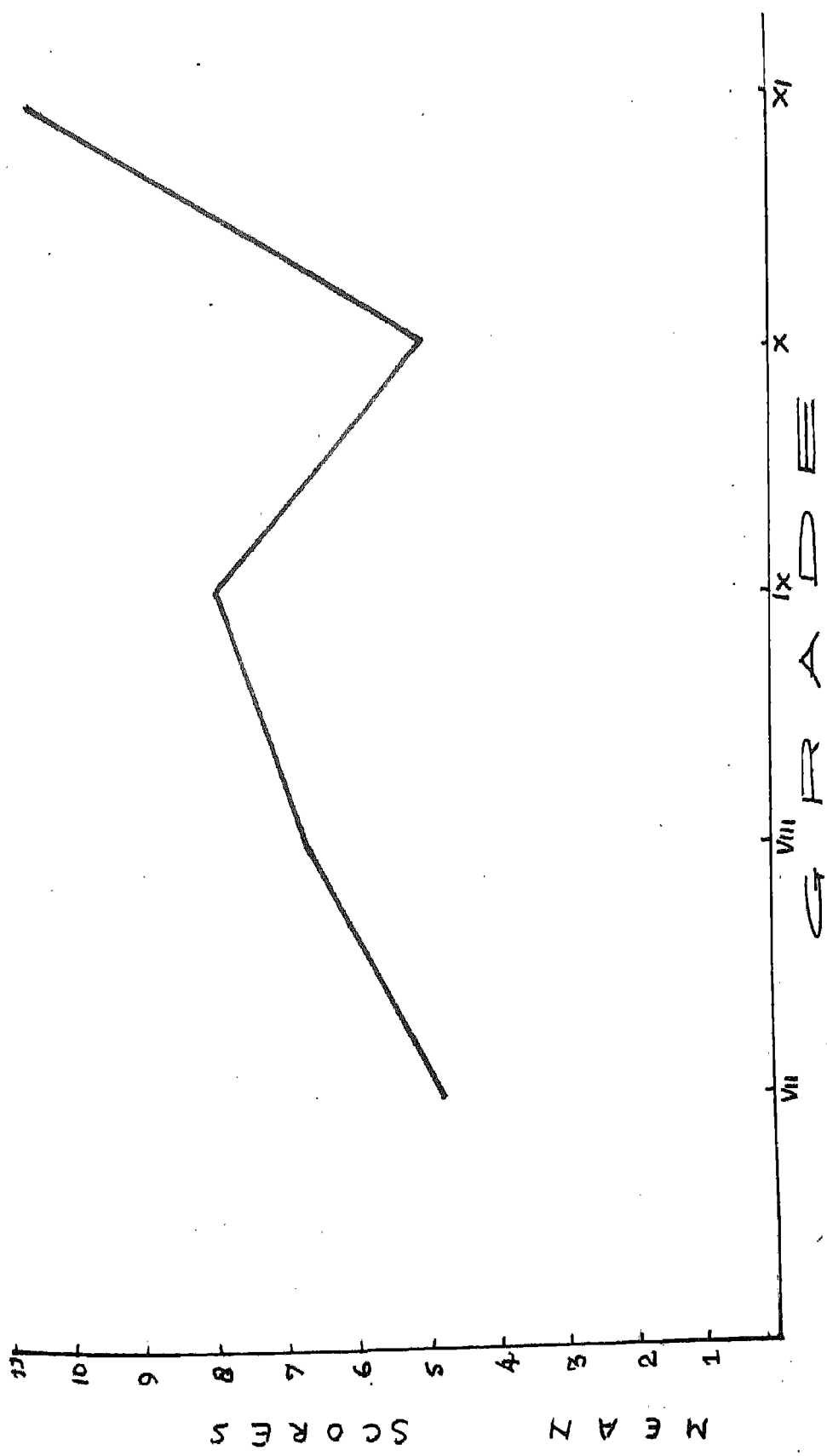


FIG 5.17 - MEAN SCORES ON 'SPACE VISUALISATION' ABILITY

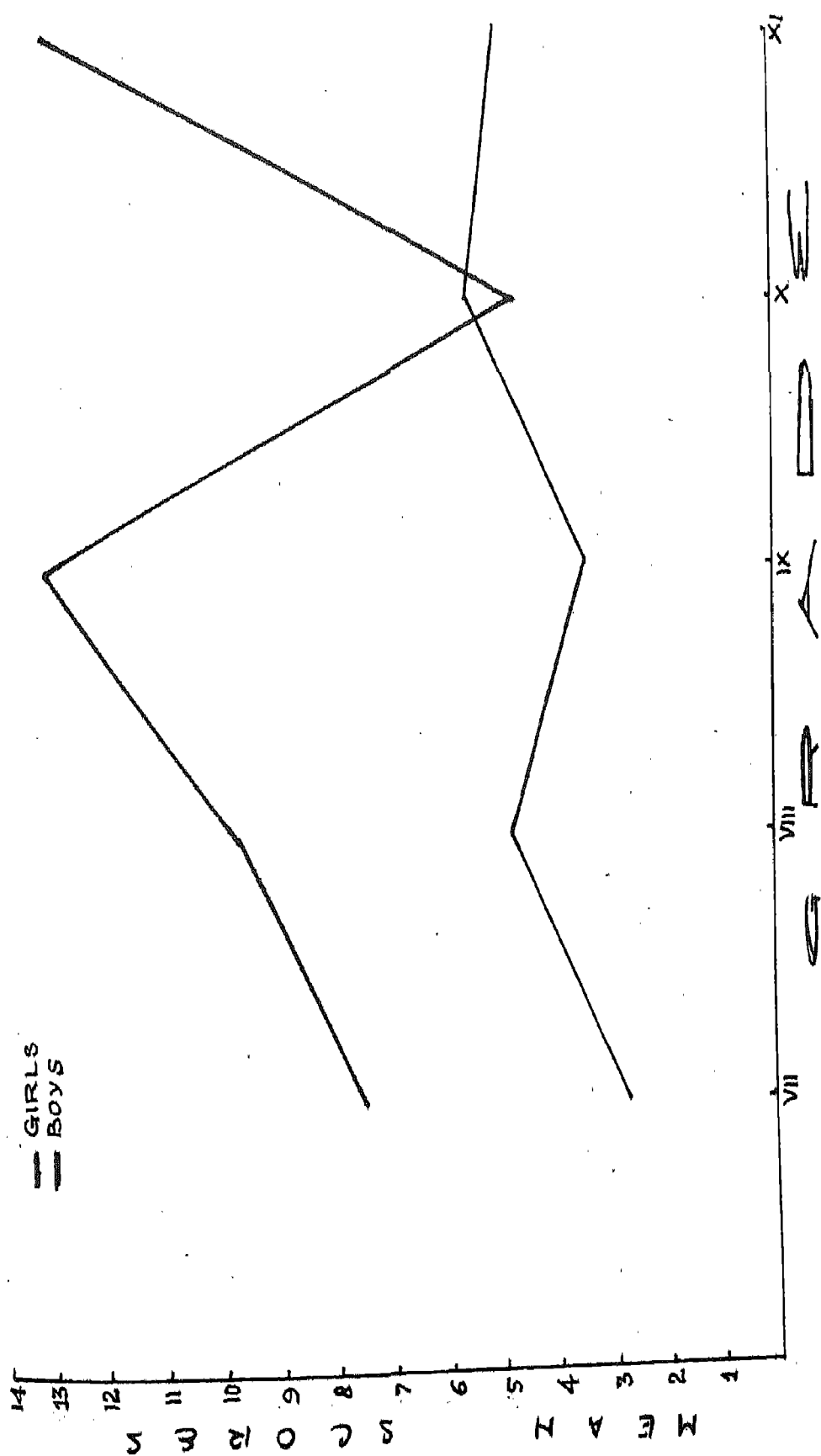


Fig 5.18- SEX DIFFERENCES ON 'SPACE VISUALISATION ABILITY

3- Students who are intelligent, enthusiastic and conforming but having some ergic tension are better placed on this ability.

4. Sex, followed by grade are the most deciding factors in shaping this ability. Thus this ability seems to be predominantly governed by such biological factors as sex and educational experience.

RELATIONSHIP BETWEEN THE FOURTEEN PERSONALITY TRAITS, SEX AND GRADE AND THE PROBLEM SOLVING ABILITY OF "GRASPING THE ESSENCE OF THE PROBLEM"

The relevant correlations pertaining to these relationships are given in the Table 5.11.

TABLE 5.10

CORRELATIONS BETWEEN PROBLEM SOLVING ABILITY OF
"GRABBING THE ESSENCE OF THE PROBLEM" AND THE
FOLLOWING VARIABLES (N = 136)

~~~~~

|     |                                                                  |           |
|-----|------------------------------------------------------------------|-----------|
| 1-  | Class                                                            | .271424** |
| 2-  | Sex                                                              | .268120** |
| 3-  | Reserved, detached/warm<br>hearted outgoing                      | -.048719  |
| 4.  | Intelligence                                                     | .250095** |
| 5.  | Emotional Stability                                              | -.081630  |
| 6-  | Undemonstrative studgy/excitable,<br>demanding                   | -.167693  |
| 7-  | Obedient, mild/assertive<br>aggressive                           | -.098674  |
| 8-  | Sober serious/enthusiastic,<br>heedless                          | .006064   |
| 9-  | Desregards rules, expedient/<br>moralistic, persistent           | .009967   |
| 10- | Shy timid/adventurous,<br>socially bold                          | .045849   |
| 11- | Tough minded/tenderminded                                        | .075587   |
| 12- | Zestful likes group actions/<br>circumspect, individualism       | -.066008  |
| 13- | Self assured, secure/apprehensive,<br>insecure                   | .014638   |
| 14- | Socially group dependent/self-<br>sufficient                     | -.004917  |
| 15- | Uncontrolled, follows own urges/<br>controlled, self-disciplined | .020793   |
| 16- | Relaxed unfrustrated/tense,frustrated                            | .032113   |

---

\*\* Significant at .01 level



The following conclusions can be drawn from this Table 5.11.

1. The ability to "grasp essence of the problem" is significantly related to the following variables.

- |                      |                |
|----------------------|----------------|
| i- Grade             | (at .01 level) |
| ii- Sex              | (at .01 level) |
| and iii-Intelligence | (at .01 level) |

2. There is a moderate correlation between the ability to grasp essence of a problem and the personality quality of being deliberate. The correlation between these two variables is only .157693 which is not significant correlation even at .05 level. (At this level to be significant correlation must be .1681) but quite close to it.

3. Other personality variables are not worth considering.

On scanning the weightages of the independent variables in the multiple regression equation with the ability to grasp the essence of the problem as the dependent variable highest weightages, in order to merit, were found to be on sex followed by grades.

The above conclusions in the present study lead to the following interpretations.



- 1- The ability of grasping the essence of a problem is predominantly a developmental ability which increases age and educational experience (See Figure 5.19)
- 2- Intelligent students <sup>are</sup> ~~can~~ better placed on this ability.
- 3- Girls are better placed on this ability (See Figure 5.20)
- 4- To some extent the personality quality of being deliberate is helpful in developing this ability.
- 5- Sex followed by grade are the most influential factor in the development of this ability.

....



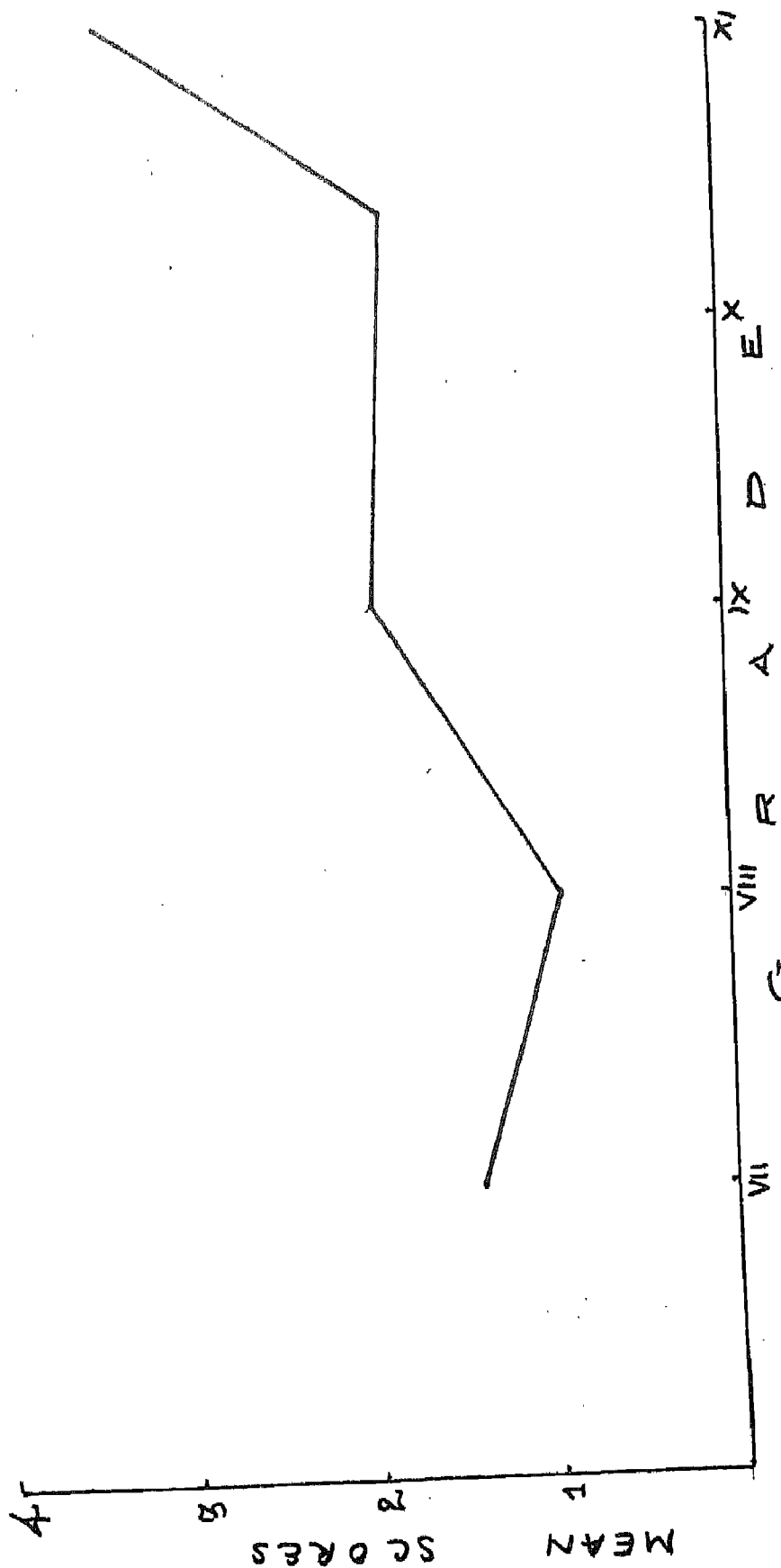


FIG. 519- MEAN SCORES ON 'GRASPING ESSENCE OF THE PROBLEM' ABILITY



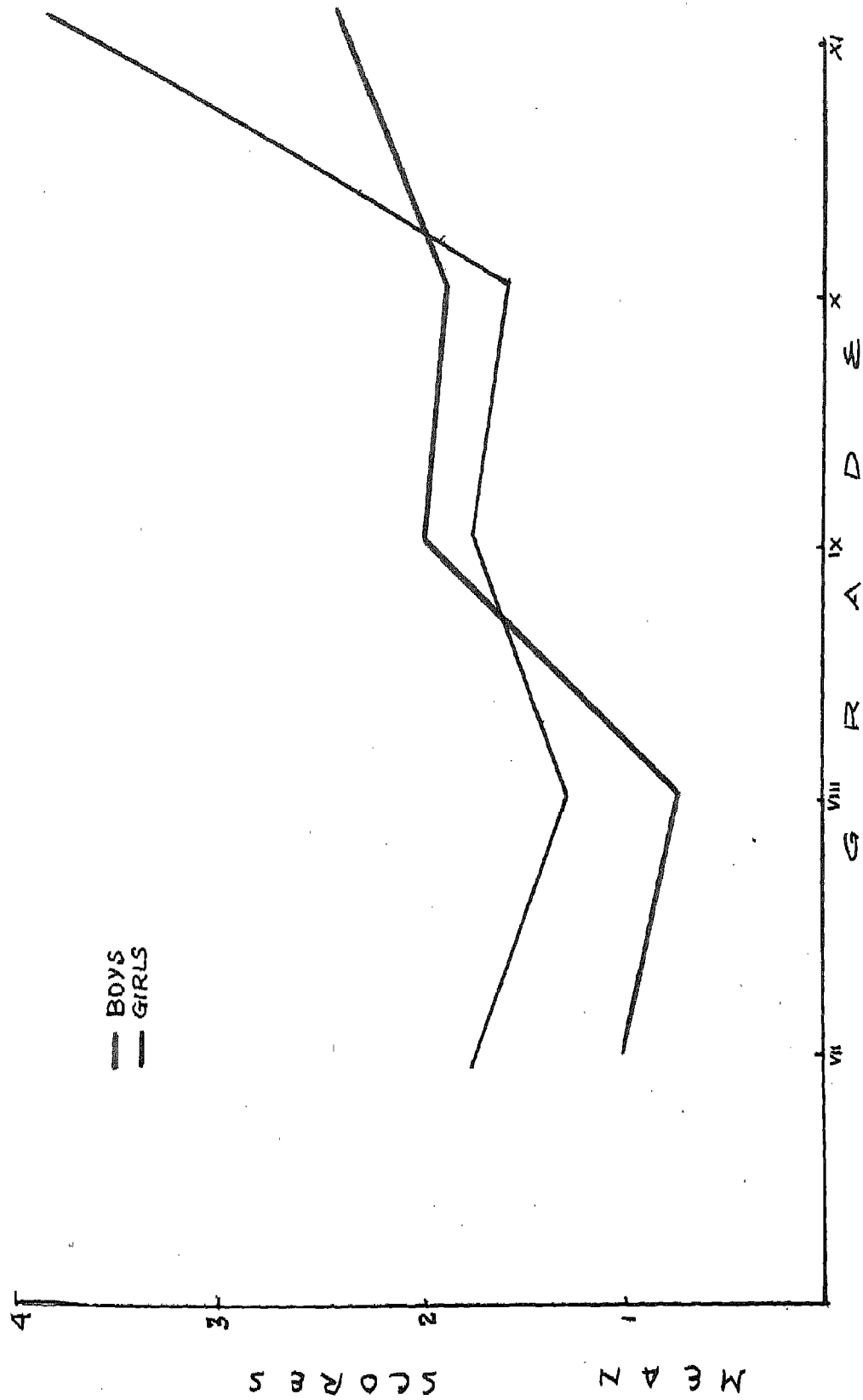


Fig 5.20 - SEX DIFFERENCES ON GRASPING ESSENCE OF THE PROBLEM ABILITY



## INDEPENDENT VARIABLES IN RELATION TO PROBLEM SOLVING TASKS

Statistically found significant correlations between Piagetian type tasks and the personality characteristics, sex and grade are given in the consolidated Table 5.12 (at the end of this Chapter). Keeping in view this summarised table, the relationship of each personality variable and sex and grade variable with different types of Piagetian tasks are discussed as follows.

### Grade and Problem Solving Abilities

Except for the abilities of 'classification' and 'grouping of thought' abilities on all other eight Piagetian type of tasks, considered in the present study, have been found to be significantly correlated with grade variable. Scores on most of these eight type of Piagetian tasks were found to be increasing through grades VII to XI. However increases is not steady in all cases. There is a one or two dips in this ride.

It seems therefore that barring the abilities of 'grouping of thought' and 'classification', problem solving, abilities involving other eight types of mental processes are developmental in nature, that they increases with age and educational experience of the child.



### Sex and Problem Solving Abilities

With the only exception, of the ability to understand the concept of 'ratio and proportion', sex has been found to be significantly correlated with all types of other <sup>nine</sup> eight-mental abilities, considered in the present study.

Except on the task requiring the understanding of ratio and proportions, girls have been consistently found to be superior to the boys on all other Piagetian tasks in this study.

### PERSONALITY QUALITY OF BEING RESERVED, DETACHED/WARM HEARTED, OUTGOING AND THE SCORES ON PROBLEM SOLVING ABILITIES

As is seen from the Table 5.12 scores on personality quality of being reserved or outgoing were not found to be significantly correlated with the scores on any of the Piagetian type of tasks considered in this study.

It seems therefore that this personality quality in no way influences any aspect of Problem solving ability.

### INTELLIGENCE AND PROBLEM SOLVING ABILITIES

Scores on intelligence have been consistently found to be significantly correlated with the scores on each of the Piagetian type of tasks considered in this study.

It seems therefore that intelligence invariably influences the problem solving ability of an individual.



### EMOTIONAL STABILITY AND PROBLEM SOLVING ABILITIES

Scores on Emotional Stability were not found to be significantly correlated with scores on any of the Piagetian type of tasks used in the present investigation.

It seems therefore that emotional stability in no way hampers <sup>or</sup> <sup>S</sup> assists the problem solving ability.

### PERSONALITY QUALITY OF BEING UNDEMONSTRATIVE, STUDGY/EXCITABLE/DEMANDING AND PROBLEM SOLVING ABILITIES

Correlation of the scores on this personality quality was found to be statistically significant only <sup>with</sup> <sup>the scores</sup> of 'formulating probing questions'. Correlations with the scores on other problem tasks were not found to be statistically significant.

It seems therefore that this personality quality does not in any significant way affect the problem solving ability of an individual. Its influence seems to be restricted to the problem tasks involving formation of probing questions alone.

### PERSONALITY QUALITY OF BEING CONFORMING/ASSERTIVE, AND PROBLEM SOLVING ABILITIES

Scores on the personality quality of being conforming were found to be significantly correlated with the scores of those problem tasks which involved,



- 1- Grouping of thought (at .05 level)
- 11- Generalisation with  
arithmetical and  
algebraic symbols (at .01 level)
- and 111- space visualisation (at .05 level)

It seems therefore that 'conforming' personality to some extent is an asset to the problem solving ability although its positive effect is not generalisable to all types of problem tasks and is confined to only particular type of mental processes mentioned above.

PROBLEM SOLVING ABILITIES OF A SOBER/ SERIOUS/  
ENTHUSIASTIC, HEEDLESS, CHILDREN.

As is evident from the Table 5.12 that this personality trait is found significantly correlated with the ability of space visualisation and to some extent with the ability of interpretation and coordination of information.

It seems that a sober and serious or just the opposite of it, an enthusiastic and heedless person need not be a good problem solver. He may or may not be, However an enthusiastic and heedless person may be better in space visualisation and interpretation and coordination of information.

PROBLEM SOLVING ABILITIES OF CHILDREN WHO  
DISREGARD RULES OR ARE EXPEDIENT/WHO ARE  
MORALISTIC OR PERSISTENT

Score on this personality dimension were found to be significantly correlated with the scores on the problem solving tasks implying,



- i- Classification
- ii- Generalisation with arithmetical and algebraic symbols.
- iii- formulating probing questions
- iv- interpretation and coordination of information
- and v- stating and testing hypothesis

It seems that persistent individuals are more likely to be good problem solvers.

PROBLEM SOLVING ABILITIES OF SHY TIMID/ADVENTUROUS  
ADVANTAGEOUS SOCIALLY BOLD CHILDREN

This personality dimension has not been found to be significantly correlated with any of the problem tasks included in this study. It seems therefore that this personality dimension in no significant way influences the problem solving ability of an individual.

PROBLEM SOLVING ABILITIES OF TOUGH  
MINDED/TENDERHEARTED CHILDREN

This personality dimension has been found to be significantly correlated with problem tasks involving,

- i- grouping of thought
  - and ii- stating and testing hypotheses
- and to some extent with the tasks involving interpretation and coordination of information.

It seems therefore that sensitivity in behaviour has some positive influence on the problem solving ability particularly those based on grouping of thought and stating and testing hypotheses and to some extent interpretation and coordination of information.



PROBLEM SOLVING ABILITIES OF A CHILD  
WHO IS ZESTFUL, LIKES GROUP ACTIONS/  
COLLECTIVIST, INDIVIDUALISTIC, REFLECTIVE

That aspect of problem solving which involves the concept of ratio and proportion, has been found to be significantly correlated with this personality dimension.

It seems that reflective thinking is not a potential asset in problem solving tasks, except those involving the use of the concept of ratio and proportion.

PROBLEM SOLVING ABILITIES OF SELF-ASSURED,  
SECURE/APPREHENSIVE INSECURE CHILDREN

Scores on this personality dimension have been found to be significantly correlated with the scores on the problem tasks involving formulating probing question and moderately correlated with the scores involving grouping of thought and permutation and combination.

It seems that self assured personality is to some extent an asset (although not very prominently) in problem solving particularly those problems which involve the mental processes of formulating probing questions, grouping of thought and permutation and combination.

PROBLEM SOLVING ABILITIES IN SOCIALLY GROUP  
DEPENDENT/SELF SUFFICIENT CHILDREN

Scores on this personality dimension were found to be significantly correlated with only the scores on the problem task involving 'classification'.



It seems that self sufficiency is not an important personality quality contributing towards problem solving ability. But for the ability to classify, it do<sup>es</sup> not seem to be a facilitating factor for any other mental process.

PROBLEM SOLVING ABILITIES OF UNCONTROLLED/  
(FOLLOWING OWN URGES)/CONTROLLED (SELF  
DISCIPLINED) CHILDREN

Scores on this personality dimension were not found to be significantly correlated with the scores on any of the Piagetian type of problem tasks used in this study.

It seems that this personality dimension is not significantly related to the problem solving ability of an individual.

PROBLEM SOLVING ABILITIES OF RELAXED,  
FURNISHED/TENSE FRUSTRATED (HAVING  
ERGIC TENSION) CHILDREN

Scores on this personality dimension were found to be significantly correlated with the scores on the problems involving,

- i- generalisation with arithmetical and algebraic symbols
- ii- interpretation and coordination of information
- and iii-space visualisation

It seems that ergic tension is quite potent facilitating factor in a number of Piagetian type of tasks, particularly involving the above mentioned mental processes.



### OVERALL VIEW OF THE STUDY

The above analysis and interpretation of the accumulated data in the present study gives the following overall impression regarding the nature of problem solving ability and its relation with certain selected personality traits.

1- Barring a few exception problem solving ability was found to be invariably associated significantly with such biological and inherited and developmental factors as sex intelligence and grade (including age).

This result of the present study seems to be explained by the previous researches which also found such results so far as intelligence and developmental factors are concerned. While mentioning the characteristics of problem solving as given by Skinner and others (Skinner 1964) in Chapter I, it was noted that -

- 1- Competence in problem solving increases with age
- ii- though heavily dependent on genetic inheritance acquisition of problem solving ability is the result of developmental process and is definitely conditioned by the adequacy of stimulation and learning activity.

In the same chapter it was noted that although Piaget rejected Plato's thinking that mental structures needed for problem solving situations were innate and developed with passage of time and development of the brain albeit nourished by environmental encounters.



However Piaget could not reject the idea of the existence of certain basic structures which enable the <sup>child</sup> clud to begin interaction with his environment. Individual differences in the problem solving ability, perhaps reflects on the nature and complexity of the basic mental structure with which a child is born. It is this basic mental structure which provides the process of self-regulation <sup>an</sup> as insight into the state of disequilibrium (produced by environmental contradictions) and how to obviate this state of disequilibrium.

The results of the present study to this extent seem to be in conformity with the results obtained in previous researches. However the results showing allround superiority of girls over boys in all but one of the Piagetian type of tasks does not find any precedence in the previous researches. Only certain feasible hunches may be made in this regard.

As noted in Chapter I problem solving ability is definitely conditioned by the adequacy of stimulations and learning activity. Any learning is a factor of motivation. However any energy change becomes a stimulus only when it is perceived by the organism (sensed and attended) to and in this selection for attention motivation play a very significant role. A highly achievement motivated individual, other things remaining the same, is expected to be better stimulated by the environment and learn much more (including problem solving). In a previous study by



Naizada (1975) girls were found to be more achievement motivated than boys: May be, due to this reason girls in this study were found to be better than boys in nearly all types of Piagetian tasks, and at every grade level. But this is simply a hunch which needs a fulfilled comprehensive research to find out the relation between achievement motivation and problem solving ability.

2- The personality characteristics which were found related to problem solving ability in the present study, may be ranked according to their importance as follows,

(i) Persistence - Persistence has been found, in the present study, to be the most potent personality quality contributing positively towards solving Piagetian type tasks. Half of the tasks were found to be positively affected by this ability.

Persistence being the quality of continued motivation, the above arguments given in connection with sex, justify its importance also.

(ii) Ergic tension and conformity - Ergic tension has been found to be the next contributing factor towards developing problem solving ability. Three out of ten Piagetian tasks considered in this study were found to be significantly correlated with it. This result gets its conformation from some previous research results also (Pishkin, Fishkin and Lovalla, 1978; Gob and Farley, 1977).



Conformity also was found to be equally potent factor in problem solving. Three out of the Piagetian type of tasks were found to be potentially affected by this personality quality. In a previous study also (Tetanbaum & Houtz, 1977) tolerance for ambiguity (conformity) was found associated with problem solving ability.

(iii) Sensitivity in behaviour (Tendermindedness)

Tendermindedness also seems to be, to a certain extent, contributing towards developing problem solving ability. This personality trait has been found associated on those of the Piagetian type tasks which involve, grouping of thought and 'stating and testing hypothesis'.

Being consequent of motivations, the result seems to be in order.

3- Besides these, certain personality characteristics seem to have their local influences, for examples,

- i) Undermonstrative personality seem to be a helping factor in formulating probing questions.
- ii) enthusiasm seems to be a helping hand in space visualisation and to some extent in interpretation and coordination of information.
- iii) individualism seem to be helping in getting the concept of ratio and proportion and
- iv) self sufficiency seems to be positively effective in classification.



4- Solving Piagetian type of tasks, is a complex affair, being governed by a number of personality factors besides biological and inherited factors.

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TABLE 5-12 SHOWING STATISTICALLY SIGNIFICANT CORRELATIONS  
BETWEEN PIAGETIAN TYPE TASKS AND INDEPENDENT VARIABLES

|                                                                | Classification<br>N=119 | Grouping of<br>Thought N=119 | Generalisation<br>with Arithmetic<br>& Algebraic<br>Symbols N=119 | Permutation &<br>Combination<br>N=119 | Ratio and<br>Proportion N=119 | Formulating<br>Probing questions<br>N=136 | Interpretation &<br>Coordination of<br>Information<br>N=136 | Stating & Testing<br>Hypothesis N=136 | Space visualisa-<br>tion N=136 | Grasping the<br>essence of the<br>problem N=136 | Total of all<br>these types of<br>problems. |
|----------------------------------------------------------------|-------------------------|------------------------------|-------------------------------------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------|-------------------------------------------------------------|---------------------------------------|--------------------------------|-------------------------------------------------|---------------------------------------------|
| 1- Class                                                       |                         |                              | .02                                                               | .01                                   | .01                           | .01                                       | .01                                                         | .01                                   | .01                            | .01                                             | .01                                         |
| 2- Sex                                                         | .01                     | .01                          | .01                                                               | .01                                   | .01                           | .01                                       | .01                                                         | .01                                   | .01                            | .01                                             | .01                                         |
| 3- Reserved detached/<br>Warm hearted<br>outgoing              |                         |                              |                                                                   |                                       |                               |                                           |                                                             |                                       |                                |                                                 |                                             |
| 4- Intelligence                                                | .01                     | .01                          | .01                                                               | .01                                   | .05                           | .01                                       | .01                                                         | .01                                   | .01                            | .01                                             | .01                                         |
| 5- Emotional<br>Stability                                      |                         |                              |                                                                   |                                       |                               |                                           |                                                             |                                       |                                |                                                 |                                             |
| 6- Undemonstrative<br>Sturdy/Excitable<br>demanding            |                         |                              |                                                                   |                                       |                               | .05<br>-ve                                |                                                             |                                       |                                |                                                 |                                             |
| 7- Obedient, mild<br>(conforming)<br>assertive,<br>aggressive. |                         | .05<br>-ve                   | .01<br>-ve                                                        |                                       |                               |                                           |                                                             | .05<br>-ve                            |                                |                                                 |                                             |
| 8- Sober, serious/<br>enthusiastic,<br>heedless                |                         |                              |                                                                   |                                       |                               |                                           | .10                                                         |                                       | .05                            |                                                 |                                             |
| 9- Disregards rule/<br>expedient/<br>moralistic<br>persistent  | .05                     |                              | .01                                                               |                                       |                               | .01                                       | .01                                                         | .01                                   |                                |                                                 | .01                                         |
| 10- Shy, timid/<br>adventurous,<br>socially bold               |                         |                              |                                                                   |                                       |                               |                                           |                                                             |                                       |                                |                                                 |                                             |
| 11- Toughminded/<br>tenderminded<br>(sensitive in<br>behaviour |                         | .05                          |                                                                   |                                       |                               |                                           | .10                                                         | .01                                   |                                |                                                 | .05                                         |



Table 5.12 Continues

| 1-                                                                                   | 2- | 3-  | 4- | 5-  | 6-  | 7-         | 8-  | 9- | 10- | 11- | 12- |
|--------------------------------------------------------------------------------------|----|-----|----|-----|-----|------------|-----|----|-----|-----|-----|
| 12- Zestful, likes<br>group action/<br>circumspect,<br>individualism<br>(reflective) |    |     |    |     | .01 |            |     |    |     |     |     |
| 13- Self-assured<br>secure/apprehensive<br>insecure.                                 |    | .10 |    | .10 |     | .05<br>-78 |     |    |     |     |     |
| 14- Socially grouped<br>dependent/self-<br>sufficient                                |    | .05 |    |     |     |            |     |    |     |     | .10 |
| 15- Uncontrolled,<br>follows own urges/<br>controlled self-<br>disciplined.          |    |     |    |     |     |            |     |    |     |     |     |
| 16- Relaxed<br>unfrustrated/<br>tense, frustrated<br>(ergic tension).                |    |     |    | .05 |     |            | .01 |    | .05 |     | .01 |



## *CHAPTER VI*

### *SUMMARY*



## CHAPTER VI

### SUMMARY

Progress and welfare of a society is inseparably linked with the progress and welfare of its individual members. And the progress of and welfare of an individual is basically dependent on how best he can adjust with his environment; how best he can solve his problems. Problem solving ability is therefore one of the most important abilities which schools are supposed to develop in their students.

"Problem solving is a process of overcoming difficulties that appear to interfere with the attainment of a goal. It is a procedure of making adjustments inspite of interferences". Problem solving is directed by a goal; it is selective, insightful, crentive and critical. Even pre-school children are capable of problem solving. It incresses with age and is the result of developmental process and is definitely conditioned by the adequacy of stimulation and learning activity throughout the developmental period. It passes through several stages of development viz. sensory motor period, preoperational stage, concrete operational stage and formal operational stage. Problem solving ability is not only governed by biological and inhinted<sup>evi</sup> factors but also certain personality factors.



The present investigation is a "Study of Relationship Between Problem Solving and Some Selected Personality Traits Using Piagetian Type of Tasks".

Ten Piagetian type of tasks, included in this study, contain the following ten abilities.

- 1- Classification
- 2- Grouping of thought
- 3- Generalisations with Arithmetical and Algebraic Symbols.
- 4- Permutation and Combination.
- 5- Ratio and Proportion
- 6- Formulating Probing Questions
- 7- Interpretation and Coordination of Information
- 8- Stating and Testing Hypotheses
- 9- Space Visualisation
- and 10- Grasping the Essence of the Problem

Personality traits included in the study were those included in Hindi version of Cattell's H.S.P.Q. test of personality. These variables were chosen for study on the basis of research evidence and practical considerations.

In this study problem solving ability as such and the abilities involved in the ten Piagetian type of tasks were considered as dependent variables and the personality traits, sex and grade were considered as independent variables.

The following hypotheses were tested:

- 1- Reserved and detached children are better problem solvers.



- 2- Children with better power of abstract reasoning (more intelligent) are better problem solvers.
- 3- Children with emotionally stable and mature personality are better on problem solving tasks.
- 4- Undemonstrative and studgy children are better on problem solving tasks.
- 5- Assertive and aggressive children are not so good in problem solving as are the obedient and conforming children.
- 6- Sober and serious children have more problem solving ability.
- 7- Persistent children have more chance of having better problem solving ability.
- 8- Adventurous and socially bold children have better chances of developing their problem solving ability to the maximum.
- 9- Tenderminded children can better exploit their problem solving ability.
- 10- Zestfulness may not be of much help in developing problem solving ability in a child.
- 11- Apprehensive and insecure persons may make better use of their problem solving ability.
- 12- Self-sufficient and persons preferring their own decision are expected to be better problem solvers.
- 13- Self-disciplined children seem to better exploit their problem solving ability.



- 14- Slightly frustrated children may make fewer errors in their problem solving tasks.
  - 15- There are no sex differences in problem solving ability and
  - 16- Problem solving increases with grades and age.
- The purpose of the study was to -
- (1) decipher those personality characteristics which are generally found to be associated with the problem solving ability of a child
  - (ii) to cross validate the results of the present study with those of the previous studies and
  - (iii) to find the contribution of the investigated personality variables in predicting the problem solving ability.

The study was conducted in two higher secondary schools (one boys and the other girls) and one middle school (co-educational) in the City of Jhunjhunu. In these schools the study was conducted in Class VII through XI. In all 74 boys and 79 girls were included in this study.

The personality traits of these students were measured with the help of the Hindi version of H.S.P.O. test, originally made by R.B.Cattell. The problem solving tasks were contained in two booklets, which used previously in a Ph.D. work.



The obtained data were analysed with the help of various statistical techniques like correlation, regression equation and mean. Computer analysis of the data led to the following conclusions.

- 1- Grade was found to be significantly correlated with scores on all types of Piagetian tasks, except the following two -
  - 1) "Classification"
  - and ii) "grouping of thought"
- 2- Girls were found to be consistently better than boys on all types of Piagetian tasks except on "ratio and proportion".
- 3- Intelligence was found to be significantly correlated with all types of Piagetian tasks included in this study.
- 4- Persistence was found to be significantly correlated with the following types of abilities,
  - 1) Classification
  - ii) generalisation with arithmetical and algebraic symbols
  - iii) formulating probing questions
  - iv) interpretations and coordination of information
  - and v) stating and testing hypotheses.
- 5) Ergic tension was found to be significantly correlated with such problem <sup>tasks</sup> as
  - 1) generalisation with arithmetical and algebraic symbols
  - ii) interpretation and coordination of information
  - and iii) Space visualisation.



- 6- Conformity was also found to be significantly correlated with three types of problem tasks,  
1) grouping of thought  
ii) generalisation with arithmetical and algebraic symbols and  
iii) space visualisation
- 7- Tendermindedness was found to be significantly correlated with,  
1) grouping of thought and  
ii) stating and testing hypothesis.
- 8- Undermonstrative personality was found significantly related to 'formulation<sup>ing</sup> probing questions;  
enthusiasm was found significantly related to space visualisation and reflective personality was found to be significantly related to 'ratio and proportion.'
- 9- The rest of the personality traits were not found to be related to any of the Piagetian type of tasks considered in this study, in any significant way.

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## *APPENDICES*



## H. S. P. Q.

K V C J 1967 Hindi Edition

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## निर्देश

इस प्रश्नावली से तुम्हारे व्यक्तित्व के बारे में पता लगेगा। इसमें तुम्हारी पसन्द एवं रुचियों के विषय में प्रश्न दिये गये हैं। तुमको क्या करना है यह वो उदाहरणों द्वारा स्पष्ट कर दिया जायेगा। प्रश्न तुमको इस पुस्तिका में पढ़ने हैं और अपने उत्तर तुमको साथ में दिये गये उत्तर-पत्र पर लिखने हैं। ध्यान रहे, न तो तुम्हें इस पुस्तिका पर कुछ लिखना है और न किसी प्रकार का कोई निशान लगाना है।

उदाहरण :—

१. खाली समय में तुम क्या करना चाहोगे ?  
(क) पुस्तकालय में अध्ययन करना, (ख) अनिश्चित, (ग) सैर-सपाटा करना।
२. किसी से झगड़ा होने पर क्या तुम आसानी से दुबारा मित्रता कर लेते हो ?  
(क) हाँ, (ख) अनिश्चित, (ग) नहीं।

इन उदाहरणों से स्पष्ट है कि कोई भी उत्तर 'सही' या 'गलत' नहीं है। हर एक व्यक्ति की रुचियाँ अलग-अलग होती हैं, इसलिये तुम अपने बारे में जैसा सोचते या समझते हो, केवल वही उत्तर सही और ठीक है। प्रत्येक प्रश्न के तीन उत्तरों में से एक उत्तर तुमको ऐसा मिलेगा जो औरों की अपेक्षा तुमको कुछ अधिक उपयुक्त लगेगा। अतः प्रत्येक प्रश्न के दिये हुए तीन उत्तरों में से किसी एक पर उत्तर-पत्र में बने हुए खाने (Box) के अन्दर एक सही का (✓) निशान अवश्य लगाओ।

जिस प्रकार के प्रश्न ऊपर दिये गये हैं वैसे ही बहुत से प्रश्न इस पुस्तिका के भीतर तुमको मिलेंगे। जब तुमसे पन्ना पलटने को कहा जाए तो पहले प्रश्न से शुरू करो और अन्त तक करते चले जाओ। प्रश्न का उत्तर देते समय नीचे लिखी बातों पर ध्यान देना आवश्यक है :—

- (१) प्रश्नों के उत्तर सच्चाई से तथा निस्संकोच भाव से दो, क्योंकि गलत उत्तर देने से तुम्हारा कोई लाभ नहीं है। तुम जैसे हो या जैसा करते हो वैसा ही उत्तर दो। यह मत सोचो कि कैसा उत्तर देना उचित है।
- (२) यद्यपि इस प्रश्नावली के लिये कोई समय निश्चित नहीं है, फिर भी तुम प्रश्नों का उत्तर शीघ्रता से दो। तुम अपना निर्णय सोच-विचार कर देने की अपेक्षा तुरन्त मन में आये हुये विचारों के आधार पर दो। कुछ प्रश्न एक दूसरे से मिलते-जुलते मालूम पड़ते हैं परन्तु कोई भी दो प्रश्न बिल्कुल एक से नहीं हैं। अतः तुम्हारे उत्तर भी अलग-अलग हो सकते हैं।
- (३) बीच वाला उत्तर अर्थात् "अनिश्चित" (या 'ख') केवल तभी प्रयोग में लाओ जबकि पहले या बाद वाले उत्तर का चुनाव बिल्कुल असम्भव हो। अतः अधिकतर 'हाँ' (या 'क') 'नहीं' (या 'ग') के उत्तर ही प्रयोग में लाना चाहिये।
- (४) किसी भी प्रश्न को मत छोड़ो। अगर कोई प्रश्न पूर्णतः तुम पर लागू नहीं हो या तुम्हारी रुचि के अनुकूल न हो, केवल तभी तुम 'अनिश्चित' (या 'ख') के नीचे वाले खाने में निशान लगाओ।

अगर तुम्हें कुछ पूछना है तो अभी पूछ सकते हो, और यदि बाद में कोई कठिनाई समझनी हो तो स्वयं आकर पूछ सकते हो। किन्तु बगल में बैठे साथी को परेशान मत करो।

संकेत मिलने पर पन्ना उलटो और प्रश्नों का उत्तर देना आरम्भ कर दो।

१. जिन निर्देशों को तुमने अभी पढ़ा है, क्या तुम उन्हें ठीक से समझ गये हो ?  
(क) हाँ, (ख) अनिश्चित, (ग) नहीं ।
२. यदि अध्यापक अथवा अन्य लोग तुम्हारी व्यक्तिगत समस्या के बारे में पूछ-ताछ करते हैं तो क्या तुम :  
(क) अपनी समस्या व्यक्त नहीं करते, (ख) दोनों के बीच में, (ग) अपनी समस्या व्यक्त करके शान्ति पाते हो ?
३. गोपाल रमेश से लम्बा है । सुरेश इतना लम्बा नहीं है जितना गोपाल । सबसे लम्बा कौन है ?  
(क) गोपाल, (ख) सुरेश, (ग) रमेश ।
४. किसी कार्य का निश्चय करने के बाद, क्या तुम प्रायः  
(क) कार्य आरम्भ करने में कठिनाई (ख) दोनों के बीच में, (ग) एकदम बैठकर शुरू कर देते हो ?  
अनुभव करते हो,
५. किसी कार्य की योजना बनाते समय क्या तुम्हें उसकी सफलता में आशा या विश्वास रहता है ?  
(क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
६. जब लोग तुमको कठिन या नीरस बात समझाते हैं तो क्या :  
(क) तुम्हारा मन अन्य बातों में बहक जाता है, (ख) दोनों के बीच में, (ग) प्रतीक्षा करते हो जब तक बात समाप्त न हो ?
७. क्या तुम्हारे विचार में स्कूल छोड़ने पर तुम्हारी कक्षा के काफी विद्यार्थी तुम से जीवन में आगे निकल जायेंगे ?  
(क) हाँ, (ख) शायद, (ग) नहीं ।
८. क्या आनन्ददायक घटनाओं के विषय में तुम अपने साथियों से खूब बातें करते हो ?  
(क) हाँ, बहुत (ख) कभी-कभी, (ग) कभी नहीं ।
९. क्या तुम ऐसे सहपाठियों को पसन्द करते हो जो :  
(क) मुख्यतः शान्त और मननशील होते हैं, (ख) दोनों के बीच में, (ग) फुर्तीले, मजाकिये और हाज़िर-जबाब होते हैं ?
१०. अपना आधा घन्टा तुम किस प्रकार व्यतीत करोगे ?  
(क) रोचक बातों की पुस्तक पढ़कर, (ख) अनिश्चित, (ग) हास्यप्रद पुस्तक पढ़कर ।
११. रात को अन्धेरे में सोते समय क्या तुमको कभी-कभी ऐसा लगता है कि जैसे तुम्हें किसी का चेहरा दिखा हो या कोई चल रहा हो ?  
(क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
१२. खतरा होते हुए भी क्या तुम शत्रु से संघर्ष करना पसन्द करोगे ?  
(क) हाँ, (ख) शायद, (ग) नहीं ।
१३. किस परिस्थिति में तुम अधिक परेशानी अनुभव करते हो ?  
(क) समूह में अत्यधिक क्रियाशील हो जाने पर, (ख) अनिश्चित, (ग) समूह की क्रियाओं में भाग न लेने में ।
१४. क्या तुमको नये मित्र बनाने में आसानी होती है ?  
(क) हाँ, (ख) अनिश्चित, (ग) नहीं ।
१५. क्या तुम्हें खेल के मैदान में लोगों को देखने की अपेक्षा टीम का उत्साह बढ़ाने के लिए शोर मचाने में अधिक आनन्द आता है ?  
(क) हाँ, (ख) शायद, (ग) नहीं ।
१६. क्या तुम अपने दोस्तों के साथ घूमते समय अधिकतर चुप रहते हो ?  
(क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
१७. कक्षा में पूछे गये प्रश्न का उत्तर देने की तीव्र इच्छा होने पर क्या तुम कभी-कभी अंगुलियाँ चटकाने लगते हो ?  
(क) हाँ, (ख) शायद, (ग) नहीं ।
१८. घर के काम के लिये जितना समय लगाने को कहा जाता है क्या उससे अधिक समय लगाने में तुम विश्वास करते हो ?  
(क) हाँ (ख) शायद, (ग) नहीं ।
१९. जब कोई तुम्हारे कार्य में बाधा डालता है तो क्या कभी इतना गुस्सा आता है कि उसे मार बैठो ?  
(क) हाँ, (ख) शायद, (ग) नहीं ।

२०. जब तुम कक्षा में किसी विषय पर चर्चा करते हो तो क्या तुम्हारे साथी उसमें तुम्हारे समान उत्साह नहीं दिखा पाते ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
२१. जब तुम्हारे सहपाठी तुमसे बिना पूछे तुम्हारी वस्तुओं से खेलने लगते हैं, तो क्या तुम :  
 (क) उसे हमेशा ठीक समझते हो, (ख) दोनों के बीच में, (ग) उन्हें झिड़क कर भगा देते हो ?
२२. “अनुत्तीर्ण” का जल्दा होता है :  
 (क) रहना, (ख) सफल होना, (ग) कोशिश करना ।
२३. जब शान्त रहना उचित हो तो क्या उत्तेजनापूर्ण घटनाओं के रहते हुए भी तुम शान्त रह पाते हो ?  
 (क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
२४. यदि तुम पर कोई क्रोध करता है तथा चिल्लाता है, तो क्या तुम :  
 (क) शान्त और मुस्कराते रहते हो, (ख) दोनों के बीच में, (ग) क्रोध से पागल हो जाते हो और तुम भी चिल्लाने लगते हो ?
२५. परीक्षा से पहले क्या तुम :  
 (क) घबराहट महसूस करते हो और इस बात से चिन्तित हो जाते हो कि जाने कौन से प्रश्न पूछे जायें, (ख) दोनों के बीच में, (ग) बिल्कुल शान्त रहते हो ?
२६. जब कोई तुम्हें उपदेश देता है (अध्यापक या गुरु की तरह) कि तुम्हें क्या करना चाहिये तो क्या तुम्हें उस पर हंसने की इच्छा होती है ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
२७. जब तुम शहर से कहीं दूर निकल जाते हो, तो क्या तुम :  
 (क) सहपाठियों के साथ मिलकर गाना पसन्द करते हो, (ख) दोनों के बीच में, (ग) शान्त प्राकृतिक दृश्यों का आनन्द लेते हो ?
२८. स्कूल में किसी नये अध्यापक या छात्र के आने पर क्या तुम उनसे स्वयं जाकर परिचय करते हो ?  
 (क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
२९. क्या तुम स्कूल में अच्छे कामों को करने के लिये अपने माता-पिता से सलाह लेते हो ?  
 (क) प्रायः, (ख) कभी-कभी, (ग) शायद ही कभी ।
३०. क्या तुम्हारा जीवन अपने परिवार के लोगों एवं मित्रों की अपेक्षा अधिक सुखमय रहा है ?  
 (क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
३१. दिन में जो बातें हो जाती हैं क्या उनको याद करके तुम कभी-कभी बहुत चिन्तित हो जाते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
३२. क्या तुम सन्ध्या के समय एक भील के किनारे :  
 (क) नावों की तीव्र गति में दौड़ देखना पसन्द करोगे, (ख) अनिश्चित, (ग) मित्र के साथ घूमना पसन्द करोगे ?
३३. जब लोग मजाक कर रहे होते हैं, तो क्या तुम :  
 (क) सोचते हो कि यह सब बचपना है और गलत है, (ख) अनिश्चित, (ग) उनके साथ में मजाक का आनन्द लेते हो ?
३४. लोगों के तुमको गन्दा, लापरवाह या चंचल कहने पर क्या तुम कभी-कभी परेशान हो गये हो ?  
 (क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
३५. क्या तुम गम्भीर बातें करने वालों की अपेक्षा उन लोगों को अधिक पसन्द करते हो जो मन बहलाने वाली (विनोदी) बातें करते हैं ?  
 (क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
३६. क्या तुमको खेल देखने में (जैसे कुश्ती, फुटबाल आदि) अधिक आनन्द आयेगा, अगर :  
 (क) तुम्हारी शर्त लगी हो कि कौन जीतेगा, (ख) अनिश्चित, (ग) तुम्हारी कोई शर्त न लगी हो ?
३७. तुम्हारे पेट में प्रायः कितनी बार दर्द होता है ?  
 (क) लगभग साल में एक बार, (ख) दोनों के बीच में, (ग) प्रति मास एक बार से अधिक ।
३८. जब बुजुर्ग लोग तुम्हारी किसी बात में सुधार करते हैं तो क्या तुम बिना जवाब दिये उनके सुझाव सुन लेते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।

६. मित्रों से वाद-विवाद के समय क्या तुम जैसा चाहते हो निःसंकोच वैसा हर एक को बतला देते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
४०. क्या तुम प्रायः एकांत में, अपने विचारों में खोये रहना पसन्द करते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
४१. इन पाँच शब्दों को देखो : यकीन, भरोसा, सीखना, आशा और विश्वास । वह शब्द जो अन्य शब्दों से मेल नहीं खाता, वह है :  
 (क) आशा, (ख) यकीन, (ग) सीखना ।
४२. क्या तुम्हारी कभी-कभी यह इच्छा होती है कि जैसे व्यक्ति तुम आज हो, वैसे न होकर तुम कुछ और होते ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
४३. जब लोग तुम्हारी उपेक्षा करते हैं तो क्या तुम्हें उनसे जलन होती है और उन पर क्रोध आता है, चाहे तुमको पता हो कि ऐसा वह लोग जानबूझ कर नहीं कर रहे हैं ?  
 (क) कभी नहीं, (ख) कभी-कभी, (ग) अधिकतर ।
४४. क्या तुम कभी-कभी अपने माता-पिता (या जिन पर तुम आश्रित हो) की मृत्यु के भयानक स्वप्न देखते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
४५. साल में एक या दो बार के अतिरिक्त क्या तुम इस बात का ध्यान रखते हो कि स्कूल का अनुशासन भंग न हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
४६. प्रायः तुम शाम का समय किस प्रकार गुजारोगे ?  
 (क) पार्टी में हंसी-मजाक द्वारा, (ख) अनिश्चित, (ग) अपने किसी ऐच्छिक कार्य द्वारा ।
४७. क्या तुम यह अच्छा समझते हो कि लोगों की स्कूल छोड़ने की उम्र न होने पर भी उन्हें अपनी इच्छानुसार स्कूल छोड़ने की सुविधा प्राप्त हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
४८. क्या तुम हिन्दी के अध्ययन में कविता सुनना पसन्द करोगे ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
४९. क्या तुम ऐसा अनुभव करते हो कि तुम कोई ऐसी चीज तलाश कर रहे हो जिसे कोई भी नहीं समझता या उसकी चिन्ता ही नहीं करता है ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
५०. तुम किसकी अधिक तारीफ करते हो ?  
 (क) एक वायुयान चालक की जो खतरनाक उड़ानें भरता है, (ख) अनिश्चित, (ग) एक बड़े कवि और नाटककार की ।
५१. कोई पुस्तक पढ़ना शुरू करने पर यदि पुस्तक नीरस लगती है तो क्या तुम :  
 (क) शायद ही पूरी पुस्तक पढ़ते हो, (ख) अनिश्चित, (ग) किसी न किसी तरह समाप्त कर ही लेते हो ?
५२. गर्मियों की छुट्टी में दस-पन्द्रह दिन के लिये तुम क्या करना पसन्द करोगे ?  
 (क) अपने एक दो मित्रों के साथ गांव में सैर-सपाटा करना एवं पशुओं को देखना, (ख) अनिश्चित, (ग) किसी कैम्प में नेता के रूप में कार्य करना ।
५३. प्रति दिन तुम लगभग कितनी बार किसी कार्य को चाहते हुए भी करने से रुक जाते हो ?  
 (क) लगभग एक बार, (ख) दोनों के बीच में, (ग) छः-सात बार से अधिक ।
५४. क्या तुम्हें अपने मित्रों के साथ गली में खड़े होकर गप्पें मारना अच्छा लगता है ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
५५. तुम क्या पढ़ना पसन्द करोगे ?  
 (क) मानव शरीर कैसे कार्य करता है, (ख) अनिश्चित, (ग) पार्टी में खेलों का प्रबन्ध कैसे किया जाता है ।
५६. प्रायः तुम क्या सुनना पसन्द करते हो ?  
 (क) संगीत, (ख) अनिश्चित, (ग) किसी अच्छे वक्ता द्वारा आधुनिक विश्व की समस्याओं पर भाषण ।
५७. यदि तुम्हारे आस-पास के लोग तुमसे लिखे-लिखे रहते हैं, फिर भी क्या तुम प्रसन्नचित्त रह लेते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।

५८. जब कोई नया विद्यार्थी तुम्हारी कक्षा में प्रवेश लेता है तो क्या वह तुमको भी उतनी ही जल्दी जान लेता है जितनी जल्दी अन्य विद्यार्थियों को ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
५९. "पहनने" का जो सम्बन्ध "कपड़े" से है वही सम्बन्ध "खाने" का :  
 (क) भोजन से है, (ख) मेज से है, (ग) टोप से है ।
६०. जो सम्बन्ध "भूल" का "खाना" से है, वही सम्बन्ध "प्यास" का :  
 (क) नल से है, (ख) पानी से है, (ग) दूध से है ।
६१. क्या तुम्हारे मन में कभी ऐसे विचार आये हैं कि तुम्हारा पैदा न होना ही अच्छा था ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
६२. अपनी कक्षा में किसी भी पद के लिये न चुने जाने पर भी क्या तुम्हें सन्तोष रहेगा ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
६३. क्या प्रायः तुम अपने जेब-खर्च के बचे हुए पैसे से :  
 (क) अपने स्पोर्ट्स के अध्यापक को उनकी सकलता पर एक सुन्दर सा उपहार दोगे, (ख) अनिश्चित, (ग) किसी धर्मार्थ कार्य में लगाओगे ?
६४. लोगों के ऐसे प्रश्न पूछने पर जो कि उनको नहीं पूछने चाहिए फिर भी क्या तुम उनको नम्रता से उत्तर दे देते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
६५. क्या तुम लोगों के मनोरंजन के लिये साहसिक कार्य करना पसन्द करते हो ?  
 (क) हाँ, (ख) कभी-कभी, (ग) नहीं ।
६६. क्या तुम निश्चय कर लेते हो कि तुम जो कार्य कर रहे हो वह एक अच्छा कार्य है ?  
 (क) शायद ही कभी, (ख) कभी-कभी, (ग) प्रायः हमेशा ।
६७. क्या तुम अपने विचारों को शब्दों द्वारा आसानी से व्यक्त कर लेते हो ?  
 (क) अधिकतर, (ख) कभी-कभी, (ग) कभी नहीं ।
६८. जब तुमसे अपने विचारों की पुष्टि के लिए कहा जाता है, तो क्या तुम :  
 (क) अपने आपको बोलने में असमर्थ पाते हो, (ख) दोनों के बीच में, (ग) हमेशा उत्तर तैयार रहता है ?
६९. प्रायः कितनी बार तुम किसी बात पर इतने उत्तेजित हो जाते हो कि उस बात को दूसरों को बताये बिना तुम्हें चैन नहीं पड़ती ?  
 (क) शायद ही कभी, (ख) कभी-कभी, (ग) बहुत बार ।
७०. तुमको यदि निश्चय हो जाये कि किसी ने तुम्हारे साथ अन्याय किया है फिर भी क्या तुम उसे आसानी से भुला देते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
७१. तुम किस काम का अधिक विरोध करते हो ?  
 (क) छोटे बच्चों की देखभाल करना, (ख) अनिश्चित, (ग) ऐसे लोगों की आज्ञा पालन करना जिनको वस्तुओं के बारे में तुमसे कम ज्ञान है ।
७२. क्या तुम पसन्द करोगे कि स्कूल की नुमाइश में तुम्हारा कार्य :  
 (क) तुम्हारी अनुपस्थिति में अध्यापक द्वारा दिखाया जाये, (ख) अनिश्चित, (ग) तुम स्वयं दिखाओ ?
७३. अगर तुम मनुष्य न होते तो क्या बनना पसन्द करते ?  
 (क) समुद्र पर उड़ने वाली चिड़िया, (ख) अनिश्चित, (ग) घुड़दौड़ का एक घोड़ा ।
७४. किसी वस्तु को खरीदने की तीव्र इच्छा होने पर क्या तुम यह सम्भल सकते हो कि :  
 (क) खरीदने के पहले यह निश्चय करलो कि वास्तव में तुम्हें उसकी आवश्यकता भी है, (ख) अनिश्चित, (ग) कुछ दिन सोचने के लिये ठहर जाते हो ?
७५. किसी बात का निर्णय करने के पहले क्या तुम छोटी से छोटी बातों पर भी ध्यान देते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
७६. अगर तुम समुद्री जहाज पर हो तो तुम क्या पसन्द करोगे ?  
 (क) प्रत्येक बन्दरगाह पर उतर कर वहाँ के निवासियों से बातें करना, (ख) अनिश्चित, (ग) समुद्र में जहाज चलाना ।

७७. अगर किसी नाटक में तुमको वह पार्ट नहीं मिलता जिसको तुम अच्छे और स्वाभाविक रूप से कर सकते हो तो क्या तुम चाहोगे कि :  
 (क) तुमको बिलकुल अलग कर दिया जाय, (ख) अनिश्चित, (ग) तुमको कोई दूसरा पार्ट दे दिया जाय ?
७८. "पढ़ाने" का अर्थ होता है :  
 (क) प्रबन्ध करना, (ख) बतलाना, (ग) शिक्षा देना ।
७९. एक व्यक्ति ने एक चित्र की ओर इशारा करते हुए कहा कि "मेरे कोई भाई-बहिन नहीं हैं, लेकिन उस व्यक्ति का पिता मेरे पिता का पुत्र है, जिस व्यक्ति के चित्र को वह देख रहा था वह :  
 (क) उसका पुत्र था, (ख) उसका पिता था, (ग) स्वयं है ।
८०. अन्य बहुत से लोगों की अपेक्षा क्या तुमको अकेलेपन से कम परेशानी होती है ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
८१. घर वालों के विचार में क्या तुम अक्सर :  
 (क) गहरी नींद सोते हो, (ख) दोनों के बीच में, (ग) करवट बदला करते हो या नींद में बदबड़ाते हो ?
८२. क्या तुम कक्षा में प्रश्न पूछते रहना उचित समझते हो जब तक कि बात समझ में न आ जाये और स्वयं को सन्तोष न हो जाये ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
८३. तुम किस प्रकार किसी कठिन समस्या का हल अच्छी तरह से निकाल सकते हो ?  
 (क) स्वयं अपने आप प्रयत्न करके, (ख) दोनों के बीच में, (ग) माता-पिता या अध्यापक से बातचीत करके ?
८४. क्या तुम अच्छे मौसम में सोना पसन्द करते हो, जबकि :  
 (क) खिड़कियाँ पूरी खुली हों, (ख) अनिश्चित, (ग) खिड़कियाँ बिलकुल बन्द हों जिससे बाहर का शोरगुल इत्यादि न सुनाई दे ?
८५. गली में लावारिस और भूखे कुत्ते के पिल्ले को देखने पर क्या तुम :  
 (क) उसे उन कर्मचारियों के आसरे पर छोड़ देते हो जो आदारा कुत्तों को पकड़ते हैं, (ख) अनिश्चित, (ग) उसे घर ले जाकर सोचते हो कि क्या किया जाये ?
८६. दूसरों की अपेक्षा क्या तुम किसी बात का निश्चय ;  
 (क) बहुत आसानी और शीघ्रता से कर लेते हो, (ख) दोनों के बीच में, (ग) धीरे-धीरे सावधानी से करते हो ?
८७. किसी पार्टी में आमन्त्रित किये जाने पर क्या तुम हमेशा प्रसन्नता से जाते हो और निश्चित रहते हो कि तुम सब ठीक करोगे ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
८८. क्या तुममें कोई ऐसी विशेषताएँ या हुनर हैं जिनको तुमने अभी तक लोगों के सामने प्रगट नहीं किया है ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
८९. अगर कोई अध्यापक तुम्हारे अच्छे दोस्त की आवश्यकता से अधिक आलोचना करता है तो क्या तुम अपने मित्र के पक्ष में बोलने लगोगे ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
९०. क्या तुम अपने अध्यापकों से उन विषयों पर आसानी से बातें कर लेते हो जिनके बारे में तुम स्कूल में चिन्तित रहते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
९१. क्या तुम कभी-कभी मानसिक संघर्ष के कारण थका हुआ अनुभव करते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
९२. क्या तुम्हारी महत्वपूर्ण विषयों पर बनी योजनाएँ केवल उन निकम्मे लोगों के कारण बिगड़ जाती हैं जो अपना स्वयं का काम नहीं देखते ?  
 (क) शायद ही कभी, (ख) कभी-कभी, (ग) अक्सर ।
९३. जब तुमको एक नया खेल दिखाया जाता है, तो क्या तुम :  
 (क) ठहर कर देखते हो कि लोग कैसे खेलते हैं, (ख) अनिश्चित, (ग) एक दम सद्य खेलने की कोशिश करते हो ?
९४. क्या तुम कक्षा में प्रथम आने की अपेक्षा फिल्म में काम करना अधिक पसन्द करोगे ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
९५. किसी के गरज कर बोलने पर क्या तुम्हारी इच्छा होती है कि उसके विरुद्ध बोलो ?  
 (क) हाँ, (ख) कभी-कभी, (ग) नहीं ।

६६. बड़े हो जाने पर तुम कौन सा कार्य करना पसन्द करोगे ?  
 (क) विद्यालय निरीक्षक, (ख) अभी निश्चय नहीं किया है, (ग) किसी फैक्टरी में नक्शे बनाने का कार्य ।
६७. इन पाँच शब्दों को देखो : और, किन्तु, यदि, यद्यपि, अभी । जो शब्द अन्य शब्दों से मेल नहीं खाता, वह है :  
 (क) किन्तु, (ख) अभी, (ग) यद्यपि ।
६८. जब तुम प्रसन्नचित्त होते हो तो क्या अचानक छोटी सी बात तुम्हें दुःखी बना सकती है ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
६९. क्या तुम ऐसे मूढ़ में आते हो जब तुम जरा भी परवाह नहीं करते कि तुम्हारे मित्र तुम्हारे बारे में क्या सोचते हैं ?  
 (क) कभी नहीं, (ख) बहुत कम, (ग) कभी-कभी ।
१००. क्या तुमको कभी भी इतना अधिक असन्तोष हुआ है कि तुमने स्वयं से कहा है कि "मेरे शर्त लगाता हूँ कि अध्यापकों की अपेक्षा स्कूल को मैं अच्छी तरह चला सकता हूँ ?"  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
१०१. यदि तुम किसी पत्र के संवाददाता होते तो किस क्षेत्र की खबरें देते ?  
 (क) फिल्मी समाचार, (ख) अनिश्चित, (ग) राजनैतिक समाचार ।
१०२. तुम किस प्रकार की नौकरी चाहोगे ?  
 (क) जो स्याई और सुरक्षित हो चाहे उसमें कठिन परिश्रम ही क्यों न करना पड़े, (ख) अनिश्चित, (ग) जिसमें बौद्धूष करने और उत्साही लोगों से मिलने का अवसर मिले ।
१०३. क्या तुमको थोड़े से मित्र रखना अधिक पसन्द है बजाय बहुत से मित्रों के जैसे कि अधिकतर लोगों के होते हैं ?  
 (क) हाँ, (ख) दोनों के बीच में, (ग) नहीं ।
१०४. क्या तुम्हारे विचार में ऐसे खेल अच्छे होते हैं, जो :  
 (क) कठिन मेहनत और कोशिश करने की आदत डालते हैं, (ख) अनिश्चित, (ग) आसानी और आराम से खेले जाते हैं ।
१०५. कक्षा में बोलने के अवसर पर क्या कभी-कभी उत्तेजना के कारण तुम्हारे हाथ कांपने लगते हैं और दिल की धड़कन बढ़ जाती है ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
१०६. प्रायः तुम क्या पसन्द करोगे ?  
 (क) संगीत सम्मेलन का कार्यक्रम सुनना, (ख) शायद, (ग) सांडों की लड़ाई देखना ।
१०७. अगर तुमको धूमने का मौका मिले तो क्या तुम :  
 (क) नये-नये लोगों को व उनके रहन-सहन के विभिन्न तरीकों को देखोगे, (ख) अनिश्चित, (ग) मशीनों द्वारा बड़े-बड़े कार्य एवं मनोरम दृश्य देखोगे ?
१०८. क्या तुमने आजकल या जब बहुत छोटे थे, कभी यह सोचा है कि अगर तुम कहीं सफर में खो जाओ तो क्या करोगे ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
१०९. क्या दैनिक जीवन में तुम :  
 (क) एक से मूढ़ में रहते हो, (ख) अनिश्चित, (ग) कभी-कभी अत्याधिक शक्ति और स्फूर्ति से युक्त तथा कभी-कभी एकदम थके हुए महसूस करते हो ?
११०. क्या तुम कभी-कभी बेकार की बातों से इतने चिन्तित हो जाते हो कि उन बातों से तुमको छुटकारा नहीं मिल पाता ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
१११. क्या तुम अपने लिए उन कपड़ों इत्यादि को अधिक पसन्द करते हो :  
 (क) जिनका कि फैशन होता है, (ख) अनिश्चित, (ग) जो उपयोगी और व्यावहारिक हों ?
११२. जब तुम महान कार्यों के बारे में पढ़ते हो तो क्या तुम सोचते हो कि :  
 (क) तुम भी ऐसे ही कार्य करो, (ख) अनिश्चित, (ग) ऐसे कार्य करने के लिये अन्य लोग हैं ?
११३. क्या तुमको कभी-कभी इतनी घबराहट होती है कि कहीं अचानक आवाज होने पर तुम बहुत जोर से चौक जाते हो ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।
११४. क्या तुम निश्चित हो कि तुमने प्रत्येक प्रश्न का उत्तर दे दिया है ?  
 (क) हाँ, (ख) शायद, (ग) नहीं ।



उत्तर-पत्र  
The Jr.-Sr. H. S. P. Q. FORM.....

Hindi Version 1967

बोध ..... रूकल/कलित ..... आयु ..... वंश ..... गार्ह

विशेषक ..... स्त्री/पुरुष ..... पिता या अभिभावक की शैक्षिक आयु ..... आयु ..... वंश ..... गार्ह

निर्देश—अपनी प्रतिक्रिया में दिए गए प्रत्येक संख्या के अनुसार नीचे के खाली (Box) में एक सही का निशान (✓) लगाओ :

प्रश्न १

प्रश्न २

प्रश्न ३

प्रश्न ४

प्रश्न ५

प्रश्न ६

प्रश्न ७

|     |                          |                          |     |                          |                          |     |                          |                          |     |                          |                          |     |                          |                          |     |                          |                          |
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| (क) | (ख)                      | (ग)                      | (क) | (ख)                      | (ग)                      | (क) | (ख)                      | (ग)                      | (क) | (ख)                      | (ग)                      | (क) | (ख)                      | (ग)                      | (क) | (ख)                      | (ग)                      |
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| ४   | <input type="checkbox"/> | <input type="checkbox"/> | २३  | <input type="checkbox"/> | <input type="checkbox"/> | ५२  | <input type="checkbox"/> | <input type="checkbox"/> | ६१  | <input type="checkbox"/> | <input type="checkbox"/> | ८०  | <input type="checkbox"/> | <input type="checkbox"/> | ९९  | <input type="checkbox"/> | <input type="checkbox"/> |
| ५   | <input type="checkbox"/> | <input type="checkbox"/> | २४  | <input type="checkbox"/> | <input type="checkbox"/> | ५३  | <input type="checkbox"/> | <input type="checkbox"/> | ६२  | <input type="checkbox"/> | <input type="checkbox"/> | ८१  | <input type="checkbox"/> | <input type="checkbox"/> | १०० | <input type="checkbox"/> | <input type="checkbox"/> |
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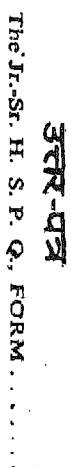
# किशोर अवस्था के विद्यार्थियों की विचार-प्रक्रियाओं का जाँच-पत्र भाग ( १ )

समय 40

विद्यार्थी का नाम \_\_\_\_\_  
 लड़का या लड़की \_\_\_\_\_  
 पिता का नाम \_\_\_\_\_  
 रोल नम्बर \_\_\_\_\_  
 कक्षा \_\_\_\_\_  
 सैक्शन \_\_\_\_\_  
 स्कूल का नाम \_\_\_\_\_  
 तारीख \_\_\_\_\_

SCORE SHEET

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उत्तर-पश्चिम

The J. R. Sr. H. S. P. Q., FORM . . . . .

हिनार्ण . . . . . पिता या अविभाक्त की नर्सिक आय २० . . . . . आधु . . . . . दध . . . . . माह

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